Tropical Modern Residential Architecture

Elements, Vocabulary and Language

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ABSTRACT

Tropical Modern Residential Architecture: Elements, Vocabulary, and Language

The purpose of this dissertation is to document and explore the design language of Tropical Modern residential architecture through its history and many built manifestations. *Tropical,* here, refers loosely to architecture built in the climatic zones of the tropics and sub-tropics around the world including other areas of the Pacific region. *Modern* refers to architecture designed with methodologies that stem from the Modernist architectural idiom but are not limited to work built in that era. In specific, precedents were researched from Tropical Modern architects such as Vladimir Ossipoff from Hawai'i, Paul Rudolph in Florida, Richard Neutra in California, Oscar Niemeyer from Brazil, and Glenn Murcutt in Australia. Their work is analyzed by comparing it to factors for regional design put forth by Henry Seckel in his book *Hawaiian Residential Architecture* (1954). This body of work and analysis is then used as the foundation for a discussion and cataloging of the design language of Tropical Modern residential architecture. The design language is broken into three parts and an overview, including vocabulary, syntax, and meaning. The argument is that by considering the factors for regional design in Modern architecture for the tropics – isolation, materials, economic conditions, climate, setting, cultural background, and environmental living – sensitive, personal and responsive architecture can be designed. This concept of the Tropical Modern design language is then tested with two design projects in O'ahu. Each design has unique clients and sites, meaning unique regional factors, which resulted in two different designs built from the same design language methodology. This process is documented and broken down into the same three parts – vocabulary, syntax, and meaning. The end result is an understanding and documentation of the Tropical Modern residential design language, and a methodology for how to perpetuate a type of architecture that speaks about the poetics of place.

Table of Contents

Table of Figures

Introduction

Tropical Modern architecture has a spirit to it like no other form of Modernism, but what is it that gives these structures this life? Is it the elements, the materials, or is it the way that they relate to their larger regional context – and not just physical context but spiritual, cultural, and environmental context as well. Houses built with this Tropical Modern sensibility are at one with nature, with their surroundings, and are perfectly balanced with the people that inhabit them. However, not all residences in the tropics are built with this sensitivity or this rigor. The concepts however seem so common place – a connection with the site, an attuned orientation to wind, sun, and rain, vernacular architecture considerations and integrations, and a greater sense of place to every element incorporated in the design. By following in the footsteps and by obtaining data from houses designed by Ossipoff, Niemeyer, Murcutt, and others, could a process or methodology emerge to perpetuate Tropical Modern residential architecture? This would be a study in the physical elements that make up the architecture, and then studied for how they relate to their context – either natural context, environmental, cultural, or regional context. With this analysis, designers can apply a school of thought, methodology, or process to unique sites and clients and create new masterpieces of Tropical Modern residential architecture. This process or methodology is called the design language. The goal is to gather the data, observe findings in relationships, create a methodology and decode the design language, then use this refined methodology to design two new residences. Each residence will have their own unique site and client, but by using the same design language derived from the analysis, will yield in two completely unique designs specifically attuned not only to the nature around them, but to the people that live within them. This research and design will attempt to create a methodology for designers in the tropical and sub-tropical region to guide their work to be more sensitive, respectful, and appropriate to the unique climate that they build in – a climate of both unique environmental conditions, but also unique people as well.

The structure of this paper starts off with a historical overview of Modern architecture in the tropics then an analysis of the concepts put forth by Henry Seckel in his book *Hawaiian Residential Architecture.* These concepts are used as the basis for analysis of five precedent studies of Tropical Modernists in different regions of the globe. These regions include Hawai‘i, Florida, California, Brazil, and Australia. The precedents serve as a basis from which the discussion of what the Tropical Modern design language consists of. The Tropical Modern design language will then be broken down into vocabulary, syntax, and composition. This language will serve as the framework for which the two design projects will be built around. The end, resulting in an analysis and representation of the Tropical Modern residential design language, and two examples of this language and methodology in use.

Physical and Theoretical Context

The term *tropical*, as referred to in this dissertation, refers to both the climatic region and other coastal regions around the Pacific Rim. The *tropical* region is hosts to many different cultures, countries, and people – from the hillsides of Japan to the shores of the Americas, to home, here in Hawai‘i. This area is further brought together by being in the tropical or sub-tropical climatic zone, and is also home to some of the most beautiful scenery that nature has to offer. The temperature is mild, the climate is calm, the breeze is warm, and the water, cool. The cultures here represent all different walks of life, from the refined traditions of Japan, to the wild dance of Brazil, to the easygoing style of the Pacific Islands. Modern architecture has flourished here –

taking cues from vernacular architecture of their host culture and opening up to the ideal environment around them. This Modern architecture that uses its clean lines, open plans, and sensitivity to site, culture, and context, can be labeled under the name, Tropical Modern. Mastered by architects and designers like Vladimir Ossipoff of Hawai'i, Oscar Niemeyer of Brazil, Glenn Murcutt of Australia, and American Modernists Paul Rudolph of Florida, and Richard Neutra and other architects of the Los Angeles Case Study Houses in the 1950's. This movement is further carried on by architects like Marcio Kogan of Brazil, Craig Steely of San Francisco and Hawai'i, Bijoy Jain from Studio Mumbai of India, and Vo Trong Nghia of Vietnam. Their work, as well as the work of others, will be analyzed to find out what it is that makes their designs so attuned to their locale.

The physical context of this project is within the tropical and sub-tropical region, and the exact sites for the two residential designs are on the island of O'ahu. The goal was to design these residences both in Hawai'i but with two different clients and at two different sites, with the intention to yield two different designs from the same methodology. Sites and clients were picked based on their juxtaposition from each other and their 'real world' application – meaning that sites and clients were not picked just because they were ideal for this typology of architecture.

Research Methodology

The research outline for this project consisted of a six step process consisting of three primary research methods. The three research methods are interpretive-historical research, case study and site analysis, and correlational research. The outline for this design research project follows these six steps which will be further explained – collect data, identify the elements, re-categorize, create a methodology, test methodology, then apply methodology.

The first step in the action plan is to collect data. This started off with an in depth study of the masters of Tropical Modernism from different regions around the globe. This study yielded in identifying what makes their work Tropical Modern – is it based on the individual, is it the culture, or was it a manifestation of climate and material working together? This area of research is a large portion of the initial data and each architect is compared to not only the regional factors for design, but also to modernism as a whole. Once understood of who was being used as precedents, the next step of data collection was taken. What this primarily consisted of was compiling raw data of the particular elements of Tropical Modern residential design. This includes, but is not limited to, roofs, windows, doors, shading devices, outdoor rooms, and furniture. The collection of this data was documented as primarily axonometric illustrations of historical examples from buildings of interest. The illustrations show size, scale, and an overall diagram of how these elements work. This was based on extensive collection of the elements themselves from many different projects and homes. By gathering drawings and measurements from different projects and resources, this severed as the raw data for the research project.

The second step was to identify the elements. This was the categorization of the raw data collected from different projects and re-organizing them based off of their typology – sliding doors, roofs, outdoor spaces, windows, floor plans, etc. This catalog of the elements acts as a source book for future design decisions.

The next step was then to analyze the elements based on regional factors. The regional factors are based on factors discussed in the publication *Hawaiian Residential Architecture* written by Harry Seckel in 1954. In his book, the main factors for regional design in the tropics are *isolation, materials, economic conditions, climate, setting, cultural background*, and *environmental living*. These categories have overlaps with another set of categories developed initially for this project; *Behavior*, meaning people's behavior or interaction with the elements; *Culture*, meaning which culture the elements came from – Japanese, Aborigine, Indian, Hawaiian, etc.; *Climate*, meaning which elements are used to in passive environmental strategies; *Use/Function*, meaning the architect's intention for how an element is to be used; *Environment*, meaning the connection with nature.

From this analysis of the individual elements that make up Tropical Modern residential architecture, a design language was extracted. This language consists of words, syntax and poetry. Understanding how to 'speak' this language yields in a methodology for designing in the tropics. This methodology is akin to a step-by-step process or a kit-of-parts idea. This means that if given certain parameters for a new residence – parameters like site, climate, materials, economy, client, etc. – a basic vocabulary of elements can be calculated from the catalog of parts. The intention behind this was to create a process derived from the tropical residential typology for creating successful houses. The process is a backwards path than the research previously conducted. One starts with "end goals" or beginning deliverables. Then from the beginning information one works their way back to the elements, then the drawings, then eventually to the house. So where the research starts with the house, then gets drawn, then broken into elements, then into categories or factors, the methodology works oppositely.

The final step in the design research is to apply the methodology to two homes of my design both in Hawai'i. The main differences in the two design's parameters are different sites and two different clients. The reason for setting up an experiment like this was to show that even with some variables the same, other variables like client, culture, site, climate, environment, lifestyle and use, inevitably changes the final form of the home, even though it is based off of the same design language.

A basic diagram of how the research method went is:
House ⟶ Data ⟶ Elements ⟶ Context ⟶ Syntax ⟶ Goals

To illustrate the structure of the methodology, its diagram looks like this:
Goals ⟶ Syntax ⟶ Context ⟶ Elements ⟶ Data ⟶ House

This research of course started off with an extensive review of the existing knowledge on the subject of Tropical Modern residential architecture. Because the topic is broad covering many different countries in the tropical and subtropical regions, as well as several different architects in specific from the peak of the modern era in the midcentury, to the current day, the existing knowledge/literature review is included below. This review of architects or Tropical Modernism is broken down into an overview of the architects, their life and their experiences that may have manifested themselves later in their work, then an analysis of how their work fits within the regional factors for design put forth by Henry Seckel – isolation, material, economic conditions, climate, setting, culture, and environmental living. By breaking down the architects' work into these factors, there is a more comprehensive understanding of how their work can be a

precedent for a design language, more so than just stylistically. This comprehensive research of Tropical Modern architects is the foundation for the rest of the dissertation.

Also included in the research for this topic is the branch or research undertaken in my Practicum semester attached as an appendix. This research is a study into Hawaiian indigenous architecture – meaning not the architecture of Hawai‘i, but the architecture of the Hawaiian people pre-contact with the West. This research overlaps not only with the cultural background aspect of designing in Hawai‘i, but also the philosophy of the Practicum firm, WCIT. WCIT is a local Hawai‘i firm whose methodology is based on an understanding of Hawaiian culture, both first culture and contemporary culture, and perpetuates the knowledge and understanding of place represented in Hawaiian culture. Their work starts off with researching the background of a site, not just in terms of physicality, but also Hawaiian history, story and lore. They then use this knowledge to inform their design decisions. The research that is included in this thesis paper is an analysis of Hawaiian indigenous architecture and particularly, residential architecture. The main topic of this research is the *Kuhikuhipu’uone*, or the Hawaiian architect. Understanding the indigenous and vernacular architecture of a place is important in Tropical Modernism as in represents minimal means of shelter that harmonizes with climate, environment, and is a representation of the culture.

Literature Review

When you go to the tropics, a place of cool breezes, white sandy beaches, sounds of the ocean, green mountain tops and thick vegetation, you understand that you humbled to the natural beauty around you. The land is truly blessed with bountiful flora and fauna, ideal climatic conditions, breathtaking topography, as well as cultures that understand and respect these blessings. Indigenous architecture came from this respect and understanding of the environment. Houses were made as open air structures that protected their dwellers from the high tropical sun and the sometimes days-on-end rain showers. They were simple and made from the local vegetation, but they were also small, as they were only thought of as retreats, for most daily activates would happen in the beautiful and comfortable outdoors. When Western countries came and colonized the tropics, it brought with it Western architectural building traditions, buildings "of sometimes dubious appropriateness to their new climate,"[1] according to Barreneche. They were adapted and appendaged with add-ons and subtractions that made them slightly more comfortable to live in, but they were still held back by their historical Western archetype. This marked the decline of the indigenous architecture, and the inflexibility of the new Western architecture. The problem was that these new dwellings being built were based upon vernacular architecture from a different region, with a different climate and lifestyle. When Modern architecture came to the tropics, it had no preconceived notions of tradition. For some innovative architects this completely new starting point for design allowed them freedom to again be sensitive to place. Modernism became a way for architects to capitalize on new building methods and technologies, but not to achieve an idealistic image. It was used to ease the lives of their dwellers. With an inside-out approach to design, Modernist architects were able to consider climate, setting, culture, and, another unique aspect of the tropics, environmental living. This sensibility and respect to place, nature, and culture, is the true feeling of the tropics – the reason why many call this place home, and many more come to visit.

This review of the existing knowledge on Modern residential architecture in the tropics looks to firstly introduce the general history of Modernism, then its history in the tropics, then move to what Hawai'i architect Harry W. Seckel calls, regional factors for architecture in the tropics. The framework put forth by Seckel will be used as a way to analyze the work of Modernist masters – from modernism at its peak to modernist of today – from different locations in the region; Vladimir Ossipoff of Hawai'i; Richard Neutra of California; Paul Rudolph of Florida; Oscar Niemeyer of Brazil; and Glenn Murcutt of Australia.

[1] Raul A. Barreneche, *Pacific Modern* (New York: Rizzoli International Publications, Inc., 2006), 7.

Modernism

Like most movements in architecture – or in society – Modernism was a counter movement – a movement or idea that went against the common flow at the time. To understand Modernism you must also understand what it was seeking to do differently. In the early twentieth century, most architectural schools of thought followed the Ecole des Beaux Arts idiom, one which put style and re-representation of antique classics at the highest level of achievement. Honor to the classics was stressed greatly, despite simultaneous innovation in construction methods and material technologies. Also despite the locale of the architecture, despite not being built in Italy or Greece, architecture strived to evoke the prestige of their classical styles. Modernism set to get away with "style," and set out to embrace new technology, embrace place, and be forward thinking rather than backwards dwelling. As Hochstim describes Modernism,

> Modern architecture was not based on the invention of a new style, but on the desire to improve human habitation and to liberate design from the prescribed use of historical precedents, which had overtaken the field throughout much of the nineteenth century. It has its roots in a combination of rationalist and romantic movements and the technological advancements of the Industrial Revolution. Modernism emulated vernacular architecture's honest expressions of both function and construction methods. In the nineteenth century, writings by John Ruskin and Viollet-le-Duc advocated the honest expression of function and materials, and influenced European and American architects.[2]

Despite Modern architecture having many different typological manifestations, it was its reimagining of residential architecture that is most relevant to this topic. Through the embracing of the new structural methods brought on by the Industrial Revolution, architects were able to give liberty to their residential designs and rethink what a house really is. As Hochstim explains:

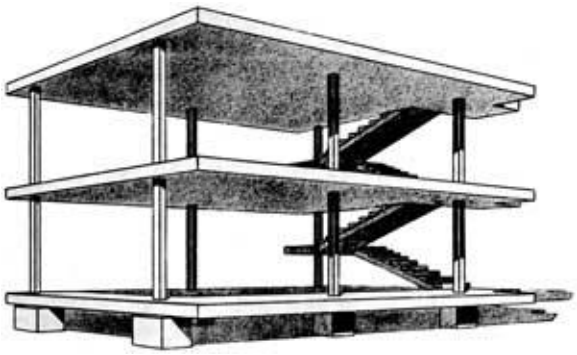

Fig. 1. Le Corbusier & Pierre Jeanneret, *Maison Dom-ino*. 1964.

Fig. 2. Le Corbusier, *Villa Savoye*. 1929-1930, Poissy-sur-Seine, France.

> In the early decades of the twentieth century, architects throughout Europe reimagined the house in a modern idiom. Le Corbusier famously called the house "a machine for living" – one that should be as sophisticated in its mass production as machines such as cars: comfortable, efficient, and affordable. His 1914 design for Maison Dom-ino (Fig. 1) proposed the use of a new concrete

[2] Jan Hochstim, *Florida Modern* (New York: Rizzoli International Publications, Inc., 2004), 17

construction system of flat slabs supported on freestanding recessed columns, allowing complete freedom of arrangement of exterior and interior enclosures unhampered by traditional masonry bearing walls. Le Corbusier's principles culminated in the iconic Villa Savoye (Fig. 2), in Poissy, France, of 1928-31, which sits upon the landscape like a piece of furniture.

Based on the elimination of ornament and Wright's space-defining principles, the De Stijl architects in Holland created dynamic interpretations of the modern house. But perhaps no Europeans had a larger effect on American architects than the Germans, particularly Walter Gropius and Ludwig Mies Van der Rohe at the Bauhaus in Germany. Gropius's most famous work is the 1926 building that houses the Bauhaus school (in Dessau), of which he was director. It sums up all the modernist principles of expressing function and dramatizing the new building technologies. His few residential projects in Germany, and later in the United States, embodied simplicity and logic, enthusiasm for new technology, and respect for traditional materials. Mies van der Rohe, who assumed the directorship of the Bauhaus just before it was closed by the Nazis, provided the most succinct theoretical basis for the new architecture with his famous axiom, "less is more." It established the minimalist aesthetic, which reduces architecture to essentials in order to achieve perfection, and thereby beauty, and is best represented by Mies's acclaimed 1926 German Pavilion at the World Exhibition in Barcelona (Fig. 3).[3]

Fig. 3. Ludwig Mies van der Rohe, *International Art Exhibit, German Pavilion, exterior*. 1929, Barcelona.

Fig. 4. Ludwig Mies van der Rohe, *Farnsworth House*. 1945-1950, Plano, Illinois.

Both Gropius and Mies left Germany for the United Stated in the 1930s, where they landed incredibly influential teaching posts and shaped a generation of American architects. Gropius was chair of Harvard University's School of Design, and Mies became a professor at Chicago's Armour Institute (later renamed the Illinois Institute of Technology, or I.I.T.), where he was put in charge of designing a new campus. His I.I.T. buildings, in steel and glass, clearly express the skeletal structure and derive their beauty from the adherence to strict proportions. In doing so, they revived America's architectural modernism, which had begun in Chicago at the end of the nineteenth century.

The Chicago School, under the leadership of Louis H. Sullivan, whose credo was "form follows function," produced the first truly American

[3] Hochstim, *Florida Modern*, 19

architecture: skyscrapers, which, rather than being garbed in historical facades, revealed their steel skeletal structure. Sullivan's famous apprentice, Frank Lloyd Wright, furthered his master's new direction with his own revolutionary residential designs – Prairie houses, whose cantilevered balconies and roofs stressed horizontality and reflected the flat plains of the American Midwest. Inside, their open floor plans were just as unprecedented as their exteriors. In 1910 Wright's Prairie houses (Fig. 5-6) were published in Germany, mainly as drawings, and inspired the European pioneers already mentioned. Of great significance was the way Wright "broke the box" – blending exterior and interior spaces and dynamically juxtaposing the vertical and horizontal planes defining these spaces. Wright's work was distinctive in its close relationship to nature. His buildings were "organic," placed sensitively on their sites.[4]

Fig. 5. Frank Lloyd Wright, *Robie House*. 1907-1909, Chicago, Illinois.

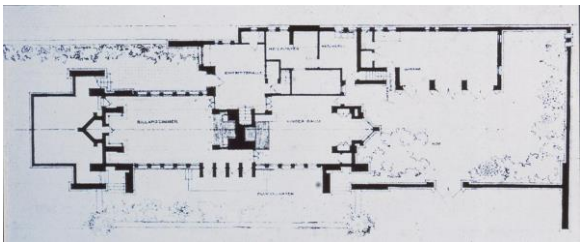

Fig. 6. Frank Lloyd Wright, *Robie House plan*. 1909, Chicago, Illinois.

Fig. 7. Richard Neutra, *Lovell House*. 1929, Los Angeles, California.

Fig. 8. Frank Lloyd Wright, *Edgar J. Kaufmann House (Fallingwater).* 1936-1939, Bear Run, Pennsylvania.

Fig. 9. Richard Neutra, *Kaufman House*. 1946, Palm Springs, California.

Fig. 10. Pierre Koenig, *Case Study House No. 22 also known as Stahl House.* 1960, Los Angeles, California.

[4] Hochstim, *Florida Modern*, 19

Rudolph Schindler and Richard Neutra, two Viennese architects who came to the United States before the arrival of other modernists dispersed by Hitler, started working for Frank Lloyd Wright and soon established themselves in America as leaders of European rationalism blended with Wright's organicism. Neutra's spectacular steel-framed Lovell House in Los Angeles of 1927-29 (Fig. 7) was in line with some the most advanced work of that time produced by Gropius, Mies van der Rohe, and le Corbusier. It even had considerable influence on Frank Lloyd Wright, his former mentor, whose 1936 Fallingwater (Fig. 8) house in Pennsylvania became one of the most famous hoses of the twentieth century. During the 1930s and 1940s Wright advocated a new American residential model with his Usonian houses. Neutra, further blending rationalism with organic principles, produced some of the most advanced modern California residences.

Periods of political and social upheavals, particularly economic slowdowns with ether scarcity of construction activity, provide architects the opportunity to generate new ideas and reflect on the future of architecture. Those are the times of reassessment of past developments and exploration of theoretical and technical innovations awaiting implementation. Thus, during the Second World War many currents of thought were consolidated into cohesive plans for the future. At the end of the war the United States offered the most fertile soil for modern architecture. With the devastation suffered by Europe and the poor economic conditions of so many countries worldwide, it was in America that modernism's dream had the best chance to be realized.

By 1945, Frank Lloyd Wright, the seventy-eight-year-old founder of the American modern movement and an inspiration to European pioneers, was the indisputable master of American and world architecture, Ludwig Mies van der Rohe and Walter Gropius, as well as other European leaders of modernism who immigrated to the United States, were instrumental in bringing the new architecture to fruition. Additionally, the second generation of modernists, taught and trained by these masters, formed the cadres of designers and teachers transforming American architecture.

In residential design the spotlight was on the pristine steel and glass houses such as Mies van der Rohe's Farnsworth Hose (Fig. 4) in Plano, Illinois, Philip Johnson's own glass houses in New Canaan, Connecticut, and the Case Study houses in California by Charles Eames, Richard Neutra (Fig. 9), Craig Ellwood, Pierre Koenig (Fig. 10), and others. Not far behind was the recognition of modern residential work in Florida, especially in Sarasota. Designs in the modern manner were, however, still a rarity, as they continue to be to this very day. The token concessions to modernism were stylistically transitional "ranch houses" of suburban tract development that hinted at contemporary features of open living-dining-kitchen areas and large picture windows.[5]

[5] Hochstim, *Florida Modern*, 17-24

Modernism in the Tropics

Design in the Tropics

When discussing Modernism in the Topics, you must first start in the same way that Modernist architects started their discussion of designing in the tropics – with the tropics itself. As discussed in the previous section, Modernism was about freedom of design from historical precedents primarily based in European and Western countries – so when it came to the tropics there was already a history of building with these imported European styles. The colonizers brought with them their building traditions, usually better suited for other climates and locales. These archetypes were built in disregard to environmental comfort and cultural sensitivity. Over time they were slightly adjusted or altered to better meet the new climate, but because they were built for and by people whose day-to-day customs and rituals were not attuned to this new living, they were stifled from being innovative or truly accommodating. As Marc Treib explains in the book, *Hawaiian Modern*, these imported styles of architecture were meant to be autonomous – based off of orders and theory, not site and environment.

> There is a long tradition of an autonomous architecture – that is, an architecture evolved from issues of form and symbolism rather than location and climate. Neoclassicism and International Style modernism share this particular trait, as both attitudes often denied certain constraints characteristic of the specific site, at least to some degree. To architects with these beliefs, the image of the building was the primary basis for an appropriate architectural idiom. In the case of Hawai'i, in the early years of colonization this often meant a reference to a steeply pitched roof, perhaps of thatch in the native manner. During the 1920s, however, architects designing commercial and institutional buildings employed a modified version of the California Mission – perhaps better termed Mediterranean – style in which an increased number of windows perforated the thick masonry walls, the pitch of the tile roof was reduced, and the patio became a common plan type. These modifications functioned better climatically as well, thus securing an experiential bonus. In all, we might have say that the imagist group adapts an idea of an autonomous architecture, often alien to the site, to the particularities of the place – but it does not necessarily deny any of the environmental benefits that might be gained in the process.[6]

Modernism designed with sensitivity to location was a way for these tropical inhabitants to rid themselves of imported ideas and start anew. Not the International Style form of Modernism, but the regionalist Modernism, became the platform not only for a new type of living, but a liberty from non-indigenous architectural traditions. As Raul A. Barreneche explains in his book, *The Tropical Modern House*,

> As foreign powers began importing established architectural traditions to their new colonies in the fifteenth century, Spanish villas, French chateaus, and British bungalows started springing up in Central and South America, Africa, India, and Southeast Asia. Some European housing types were altered to better

[6] Marc Treib, "Of Climate and Contour: Ossipoff's Architecture and the Hawaiian Environment." In *Hawaiian Modern: The Architecture of Vladimir Ossipoff* ed. Dean Sakamoto (New Haven: Honolulu Acadmey of Arts, Yale University Press, 2007), 72.

> suit the year-round heat of their new locations, for instance, adding shady courtyards and verandas that offered more space for outdoor living. As modernism came onto the scene in the mid-twentieth century, many European colonies in the tropics were shedding their European rulers and emerging as independent countries. Modernism represented a clean break not only from neoclassism as a style, but also the associations with colonial domination. As a chance for newly independent nations to establish their own architectural identity, the movement flourished in former colonies from Sri Lanka to Singapore to Guyana.[7]

So when the architects of the region, during the mid-twentieth century, started creating a new architectural tradition with a sensibility to its locale and place, they started with two primary strategies. The two strategies were vocabulary and climate. They first looked to the architectural elements and forms of the indigenous and folk architecture of the region. Picking up elements and vocabulary to use on their designs connected them with local traditions. The second thing they did was take note and considerations of the environment and context. Considerations of climate, landscape and culture.[8]

The first strategy was then to look at the vernacular architecture of the location. The vernacular architecture is devoid of outside influence and built to accommodate the lifestyles and climate of the location. Looking to it for design inspiration helps to inform architects and designers what are the minimum necessities for living in this location. Because one of the main goals of Modernism is to improve human life with as little structure as possible, observing what are the essentials to inhabiting a climate is key. As Treib further explains about the vernacular/folk architecture of the tropics,

> Historically, folk architecture in hot and wet climate throughout the world addressed the exigencies of climate with a minimal structure that supported a roof with effective insulating properties, perhaps adding an elevated living platform to remove the inhabitants from the intrusion of vermin and surface moisture. In sum, one lived under an insulating umbrella, keeping sun and rain at bay while admitting as much moving air as possible. Forms such as these are common in areas as geographically diverse as the southern regions of Florida and Japan. In Florida the Seminole Indians built their *chickees* (Fig. 11) with precisely this typology, stacking palm fronds to thatch their roofs. The Japanese people sophisticated this basic type over several centuries, and within their wood-framed houses sliding panels shaped fluid spaces that fostered maximum exposure to the winds. Deep roof overhangs protected the vulnerable paper screens and the interior spaces, which were expanded outward by a transitional area in the form of a veranda.
>
> In Hawai'i, by contrast, the native peoples constructed simple huts of thatch that sat directly on the ground. Rather than open and elevated structures, the Hawaiians constructed their dwellings of wooden poles lashed together with ropes of twisted fiber and sheathed with whatever vegetal

[7] Raul A. Barreneche, *The Tropical Modern House* (New York: Rizzoli International Publications, Inc., 2011), 15.
[8] Trieb, *Hawaiian Modern: The Architecture of Vladimir Ossipoff*, 71

> material lay at hand, including grasses, sugar cane, and ti leaves. The inclined planes that comprised both walls and roof could be straight or slightly bowed, and the huts took the form today called an A-frame. Although simple to construct by following the tradition pattern, the inclined roof/wall surfaces offered little internal headroom. One dwelling type maintained open gable ends to admit cooling breezes; in others, however, doors at either end were the only apertures for egress and ventilation. Over time the house form assumed a more sophisticated guise, using true walls supporting a pitched roof to gain increased and more practical interior volume (Fig. 12). Given its enclosure, the form of the Hawaiian dwelling suggests that more life often took place outside rather than within the shelter, and the house was thus more a retreat than a stage for daily living. As a whole, the villages demonstrated little sense of planning for visual effect.[9]

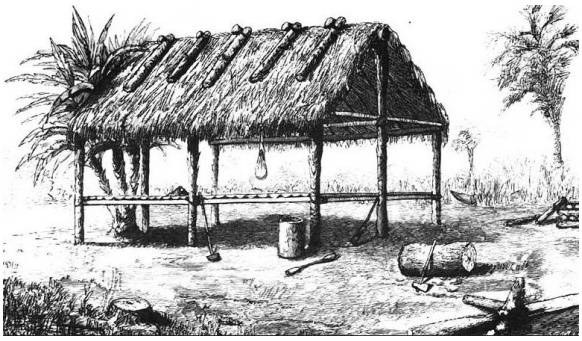

Fig. 11. ***Traditional Florida Chickee***

Fig. 12. ***Traditional Hawaiian Hale***

But to merely copy the vernacular or folk architecture wouldn't be accommodating to the lifestyles of the times. People expect a greater level of comfort and modernity to their dwellings than a grass shack.

> And still the idea of creating a house from nature, in nature, open to the four winds but sheltering, comforting and satisfying, is a model for many electing to put up a house in the tropics. They are not seeking to build from sticks and driftwood, of course, but to have a house that embodies some of the elemental spirit of the handmade hut.[10]

Tropical Modernism

The second strategy is to more directly address climate and setting. This is one of the main attributes to Tropical Modernism that makes it so successful. The sensibility to climate, the environment, and the setting creates passive structures that through their awareness are able to minimally provide maximum comfort to their inhabitants. Because the climate of the tropics is so unique and ideal, it is the overwriting force that defines Modernism in the Tropics. As Hochstim explains about the designing for the climate in Florida,

[9] Trieb, *Hawaiian Modern: The Architecture of Vladimir Ossipoff*, 74

[10] Richard Powers and Phyluss Richardson, *Living Modern Tropical: A Sourcebook of Stylish Interiors* (New York: Thames & Hudson, Inc. 2012), 7.

> Hot temperatures, high humidity, and insects make it necessary to plan outdoor extensions carefully in order for them to be usable. Before air conditioning became affordable, houses were cooled by being properly orientated to the breezes, with interior rooms arranged to allow for free airflow through the house and openings protected from sun and rain. Outdoor areas require protective insect screening. While such architectural interventions were necessary for the comfort of the inhabitants, the common Florida houses derived from models that originated outside of Florida, did not include them. Modern architecture, on the other hand, with its fresh approach to functional problem solving and its freedom from restrictions imposed by styles, provided excellent solutions to Florida living. The most prevalent approach was to organize floor plans to avoid interior hallways. That meant making houses one room deep to allow easy cross-ventilation. Large windows with operable louvers of wood or glass provided flexible control of air and light. Sliding glass doors became walls that parted, uniting indoors with screened outdoor terraces. Wide roof overhands shaded walls and openings while giving protection from frequent summer rains. In the hands of talented designers, these functional requirements transformed into a new architecture closely related to the mainstream of modernism, but uniquely expressive of Florida's climate and lifestyle.[11]

The tropics, and even just a single region within the tropics, have many different microclimates however. The varying and diverse topography creates many different environmental zones that require different design responses. Within the region that is the tropics, "there are large, thriving cities – Kuala Lumpur, Auckland, Bangkok, Sydney, Singapore, Melbourne, Jakarta – and stunning untouched landscapes, from the stark emptiness of the Australian outback and the snow-capped peaks of New Zealand's aptly named Remarkables range to Indonesia's jagged volcanic islands and Thailand's dense tropical jungles."[12] All of these different regions with their different cultural and climatic conditions all lead to their own form of architectural response. As Barreneche explains,

> But contemporary modern houses in these disparate lands do have common threads. They share an openness and simpatico spirit with the tenets of Modernism – fluid, informal spaces, porous boundaries between indoors and outdoors, and freedom from the burden of too much history – while still remaining true to the particulars of place.[13]

It is the spirit of the tropics that makes modernism work so well, as an architectural idiom, even more so than other regions of the world. Modernism is about being minimal, and in a land where nature is the dominant feature, a house that stands in contrast to nature seems out of character. Designing to be subservient to nature – incorporating and integrating it – makes for a more harmonious dwelling. "In fact, the more clean-lined and restrained the architecture, the more subservient it becomes to the richness of the natural environment and the more brilliant

[11] Hochstim, *Florida Modern*, 26-27
[12] Barreneche, *Pacific Modern*, 7
[13] Barreneche, *Pacific Modern*, 7

the contrast."[14] Modernism is about getting rid of decoration and ornamentation, and in a place like the tropics, this makes the surroundings that much more vibrant. Look to the vegetation that inhabits the tropics, "The coconut palm itself, with its linear trunk and bushy top, can be read as the happy marriage of stark and lush that the modernist building in the tropical setting conveys."[15]

Tropical Modernism vs. European Modernism

Tropical Modernism has come out as a different form of Modernism as opposed to other types around the world. "The rhythms of the tropics are different from those of the upper Midwest, or even California. Still, both show the value of regional sources and inspiration in shaping profound architectures."[16] Even though Modernism was born in Europe and further mastered in the American Midwest, it was how the climate and unique aspects of "place" in the tropics influenced and changed it. Barreneche explains,

> As modernism in the tropics evolved, architects began infusing architecture with a local flavor, making use of indigenous materials and incorporating reference to local cultures and building traditions to make houses even more of their place. Modern homes there became richer and more layered and nuanced – and consequently even more "tropical" than the pure, all-white or mostly white Euro-modernism that came before.[17]

European Modernism was developed in opposition to the historically fixated neoclassism of the time. It wanted to rid itself of references and traditions to previous buildings types. This created the "stark, boxlike buildings with flat roofs, large areas of glass, and plain white walls devoid of any ornamentation"[18] that Modernism is usually known for. But it is that integration and evolution over time that Tropical Modernism partook in that created its spirit. But even the elements of Modern design are better suited for a warm, comfortable climate as opposed to the European climate in which it came from. As Barreneche expresses,

> I have long believed that modernism is best suited to the tropics, so much more than the cold, wet, gray context of Europe, where it was born in the early twentieth century. Le Corbusier, Mies van der Rohe, and Bauhaus masters like Walter Gropius revolutionized domesticity with forward-thinking houses boasting open-plan interiors, large expanses of glass, exposed structures lifted on *pilotis* above the ground. In Europe's climate, such inventions were visual arresting but functionally left much to be desired. Exposed concrete columns and floor slabs, flat roofs, and so much glass (well before the advent of insulated double-paned windows) made for chilly, damp interior in settings such as Brussels, Paris, and Prague; but in Havana or Rio de Janeiro, such elements were perfectly suited to letting light and air and merging interior and exterior space.[19]

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[14] Powers and Richardson, *Living Modern Tropical: A Sourcebook of Stylish Interiors*, 6
[15] Powers and Richardson, *Living Modern Tropical: A Sourcebook of Stylish Interiors*, 6-7
[16] Alan Hess, *Oscar Niemeyer Houses* (New York: Rizzoli International Publications, Inc., 2006), 229.
[17] Barreneche, *The Tropical Modern House*, 15
[18] Hochstim, *Florida Modern*, 17
[19] Barreneche, *The Tropical Modern House*, 12

Types of Modernism in the Tropics

Because there are so many different cultures and microclimates in the tropics, "there is no defining "Tropical Modern" typology, as the projects on these pages clearly demonstrate."[20] Instead of an aesthetic, there is a mannerism or approach to design that all of these buildings share – a sensibility to the context, vernacular, cultural, and environmental context. In a brief wrap up of the different typologies of Tropical Modern architecture, in Hochstim's book on *Florida Modern*, he categorizes the evolution of Tropical Modern varieties. His categories are transitional, minimalist, organic, neo-vernacular, and neo-brutalist.[21] Though Hochstim is just addressing the types of modernism in Florida, these categories apply to much of the modernism in the tropics globally.

The *transitional* category of Tropical Modernism refer to houses that start to bridge the gap between traditional architecture found in the region and modern architecture found elsewhere in the world. Slight nods to both past traditions and modern aesthetics result in houses that have vernacular styled roofs paired with open floor plans and large expanses of glass. Buildings that from afar appear to be cleaned up versions of the traditional architecture of the region with straighter lines and abstractions of local flair.[22] The *minimalist* group, as Hochstim explains, was

> …derived from the International Style and strongly influenced by Mies van der Rohe, Gropius, and the Case Study houses of California, displays simple geometry of open plans, layering of interior and exterior spaces, maximum transparency, floor-to-ceiling glass or wood jalousie sliding or swinging panels, flat roofs, exposed steel or wood structural grids, and the plain articulations of the joinery of wood siding, exposed concrete blocks, or poured concrete.[23]

The *organic* Tropical Modern houses were works that tried to find a harmony with their sites and the nature around them. Inspired by the work of Frank Lloyd Wright, the houses cascade down slopes and integrate local materials, stones, wood paneling and seamless connections between indoors and out. They're designed as pieces to a whole, each room offering custom furniture, French doors, deep overhangs and spectacular views. Their emphasis is on the horizontality of the earth and a blend of nature, architecture and site.[24] Because of the many different regions and cultures included in the tropics, the *neo-vernacular* style has many different manifestations and sub types. The overarching idea of this modernist type is architecture that is influenced by the vernacular and indigenous architecture of the region. Reinterpretations of Hawaiian *hale*, pacific huts, aborigine bark shelters, or *chickee* of the Native Americans in Florida. Wood framed structures with wrap around verandas and pitched roofs, lifted above the ground like pavilions in the landscape. They represent traditional tropical solutions to living in areas of humid climates and easy going lifestyles. Their open air design are merely updated with glass jalousies and fold away glass doors.[25]

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[20] Barreneche, *The Tropical Modern House*, 8
[21] Hochstim, *Florida Modern*, 27
[22] Hochstim, *Florida Modern*, 27
[23] Hochstim, *Florida Modern*, 27
[24] Hochstim, *Florida Modern*, 27-28
[25] Hochstim, *Florida Modern*, 27-28

> The main characteristic of the *new brutalism* category emerging in the 1960s and sometime is known as *Beton Brut*, is the use of exposed concrete structure and cladding. Most common are precast concrete tees and double tees forming dramatic cantilevered roofs and balconies, and exposed concrete block walls framed by precast concrete columns and beams. Plans follow simple rectangular geometry arranged around straightforward circulation. Many of these houses are multilevel, interweaving spaces. When hoses incorporate air conditioning, great areas of fixed glass panels and solid walls can replace the openness of earlier designs, whose function was maximum ventilation. Variations of the new brutalism houses juxtapose solids and voids to create a sculptural presence.[26]

Though Hochstim is particularly discussing the varieties of Tropical Modernism in Florida, his categories could be applied more generally as well. "*Transitional*" could be applied as well to the early work of Vladimir Ossipoff in Hawai'i, as well, where he integrated historical elements like the Dickey roof (Fig. 13). The double pitched "Dickey roof" was named so after Hawai'i architect Charles Dickey who found it as a way to create tall ceilinged interiors with wide overhangs that create a wraparound verandah to deal with tropical sun and rains. Also some of the later work of architect Marcio Kogan of Brazil, (Fig. 14) incorporates elements of traditional Portuguese colonial architecture in the roof. "*Minimalist*" group of tropical homes could be applied as well to the same two architects from different periods in their work – Ossipoff's Blanche Hill house from 1961 (Fig. 30-31) and Kogan's Paraty House of 2009 (Fig. 15). "*Organic*" Tropical Modern could be found Ossipoff's Liljestrand (Fig. 20) or Pauling House (Fig. 22). "*Neo-vernacular*" can be found in Glenn Murcutt of Australia's Marika-Alderton house (Fig. 16) that embodies aborigine principles. "*Neo-brutalist*" might be found in Hawai'i's Lava Flow 7 house designed by Craig Steely in Pahoa (2013). The exercise in showing all of the different categories or groups of Tropical Modern houses put forth by Hochstim existing in different parts of the tropics and by many different architects, even within different periods of their own work, is to show that Tropical Modernism is not a "style" it is a unique approach to design.

Fig. 13. Vladmir Ossipoff, *Boettcher House*. 1937, Kailua.

Fig. 14. Marcio Kogan, *Bahia House*. 2010, Bahia, Brazil.

Fig. 15. Marcio Kogan, *Paraty House.* 2008-09, Brazil.

Fig. 16. Glenn Murcutt, *Marika-Alderton House*. 1994.

[26] Hochstim, *Florida Modern*, 27-28

Seckel's Regional Factors for Tropical Architecture:

In 1954 the Bishop Museum in Honolulu, Hawai'i, together with the AIA Honolulu Chapter, put together an exhibition on Hawaiian Houses. Though the Bishop Museum is more generally known for their exhibition of Polynesian heritage and history, this exhibition was on contemporary houses of the time. Architect Henry W. Seckel helped curate the exhibition, and in his contribution put together a publication called *Hawaiian Residential Architecture*. The intention of the publication was to put forth a framework of factors that would help facilitate a future "Hawaiian" residential typology. To put this in reference to the time and context, Hawai'i was not yet a state and would not be until 1959. Also, Vladimir Ossipoff, who is now recognized as the master or greatest forth runner of Hawaiian Modern architecture, was still just one of the many architects represented. Seckel, at one point, even mentions that "Sometimes the work of a single man or group will become the basis of a local type. To date this has not happened in Hawai'i."[27] Currently however, there is a broad understanding that when one refers to Hawaiian Modern, or great architecture in Honolulu, one is referring to the work of Ossipoff. Though few have replicated his "type" successfully, when architects and designers discuss designing in Honolulu, Ossipoff examples are brought up regularly.

Nonetheless, Seckel's publication, *Hawaiian Residential Architecture*, quite comprehensively puts forth a framework of "environmental influences" or "regional factors in Hawai'i that are favorable or unfavorable to the development of a Hawaiian architecture."[28] I will be using this framework and applying it more generally to the whole tropical region. As was true about the different groups of Florida Modernism put forth by Hochstim, the typologies and factors of one place in the tropics make it applicable to other places – with different outcomes of course. The seven regional factors that Seckel discusses, and which will be reviewed here, are *isolation*, *materials*, *economic conditions*, *climate*, *setting*, *cultural background*, and *environmental living*. He presents these as factors for regional architecture, but through each explanation shows that because of conditions in Hawai'i, as well as most of the rest of the tropics, these conditions haven't created a singular regional architecture.

Seckel starts his framework by proposing that there are two different schools or thought. One, that all architecture, everywhere, should be the same. Due to globalization and advances in building technologies, a house in one part of the world can be built exactly like one in another completely different part of the world. "They serve the same purpose, are built with the same materials and techniques and are air conditioned to the same temperature and humidity. The regional factors that used to be so important are fading. Therefore, the local differences in architecture are destined to disappear. A house is a house whether it is in Hawai'i or anywhere else."[29]

The other frame of thought is more along the lines of critical regionalism. In his words, "Man is not the same everywhere and never will be. Swedes do not live and work in identically the same manner as Panamanians. Not only are their living habits different, but so is the natural setting in which they live. Local materials and the local economy will always be an influence on building and social influences will always vary from one place to another. Rather than conform to a world-wide sameness, architecture should proudly reveal the unique characteristics of a region

[27] Harry W. Seckel, *Hawaiian Residential Architecture* (Honolulu: Bishop Museum Press, 1954), 8.
[28] Seckel, *Hawaiian Residential Architecture,* 4
[29] Seckel, *Hawaiian Residential Architecture,* 3

that distinguish it from the rest of the world. A house in Hawai'i is not-or should not-be the same as a house in Canada."[30] It is this dichotomy that Seckel seeks to unhash. By all means, we have the technology for buildings to be built the same anywhere in the world and provide the same level of comfort, but by doing this, aren't we losing the regional characters that make a place unique? This echoes the autonomous neoclassical buildings being built without regard to place around the world, and the architects of the time using Modernism as a way to re-root people back to the places they live. It is then appropriate that the first factor for a regional architecture is *isolation*, or rather its susceptibility to outside influence.

Isolation

> At first glance it might appear that the Hawaiian Islands, lying in the Pacific Ocean over two thousand miles from the nearest continent, represent a case of extreme isolation. Actually, this apparent remoteness is one of mileage only. Transportation by both sea and air from the mainland is excellent. There are no major economic, linguistic or political barriers between the Islands and the continental United States. Contact with the outer world is becoming increasingly easy. True enough a resident of Honolulu cannot get into his car and motor to another state. He is not subject, however, to anything approaching the degree of isolation that would in itself give rise to a local architecture of independent development.[31]

The architecture of Japan, can be seen as a case of Isolation. By national control under the Tokugawa Shogun in 1633, Japan was sealed off from outside contact under punishment of death. During this time Japanese art, architecture, and culture became extremely refined – its uniqueness later inspired the Western world greatly when they reopened the borders in 1853, two hundred years later. It was this isolation that gave rise to Japan's independent development of a refined local architecture. Hawai'i, and most of the tropics, despite perhaps having geographic isolation, is quite connected to the rest of the world. In today's world even more so than in the 1950's the connection is harder to sever. However, the isolation of a place is still a factor for a regional architecture – as Seckel points out, Hawai'i is not in such a degree of isolation that this would be as influential a factor as Japan.

Materials

> The Swiss had such an abundance of timber that they could use it without regard to cost. Out of this condition evolved the Swiss chalet. One could cite a long list of examples of distinctive architectural types resulting from an unbalanced supply of basic building materials. The igloo of the Eskimos is an obvious one. The adobe house of the Spanish colonists is another. One might ask, then, what basic materials Hawai'i possesses in economical abundance. The answer is simply that there are none. There are indeed many island materials used in building. Among these are local varieties of stone and, of course, coral. There are clays suitable to sustain brick manufacture and there are deposits of sand and coarse aggregates for concrete and concrete block. Sugar cane fiber is used as the basic ingredient in the manufacture of wall boards and other

[30] Seckel, *Hawaiian Residential Architecture,* 3
[31] Seckel, *Hawaiian Residential Architecture,* 4

> products. There are several species of excellent specialty woods, notably koa, ʻōhia and monkeypod. Bamboo and sisal are also locally available. Insofar as these are distinctive, their use imparts local character. But none of them is of such overwhelming excellence or is so inexpensive as to be rendered dominant in Hawai'i's building. Most of the building materials used are imported.
> There is little in this situation that could be expected to produce strong regional characteristics in Hawai'i's architecture.[32]

Even if material abundance might not be a factor for defining a regional architecture, "their use imparts local character." As Phyllis Richardson states in *Living Modern Tropical*, "The simplicity of a modernist building that focuses on a few well-chosen materials has a more immediate connection to the surroundings, especially when those materials are taken from or reflect the local natural resources."[33] There might not be the abundance for all the architecture of the tropics to be made of one material, but none the less, the materials of the tropics, and especially those tied to that particular place, do help ground it in its locale.

Economic Conditions

> Where an unusual relationship exists between the cost of labor and materials, a special type of architecture can be expected to develop. The Japanese house, for example, was designed to use material sparingly at the expense of increased labor for labor in Japan was cheap. Nothing is cheap in the modern American scene, but it is labor rather than material that must be used sparingly. That is why the intricate handicrafts of the past have disappeared from modern American buildings. The situation in Hawai'i is not markedly different from that in the rest of the United States so that it is not in this direction that we can expect to find a basis for a different architecture.[34]

In this condition, where both labor and material are expensive, it could be said that it is best to use less of both. Contrary to Seckel's statement that because both are expensive there is not created a different type of architecture, I think that things have progressed differently since the 1950s. Building construction methods have further innovated, and it is now possible to create much more with less and quicker. For example in two of the houses done by Craig Steely in the Big Island of Hawai'i, Lava Flow 5 (Fig. 17) and Lava Flow 7, they both use unique construction methods that cut down on both material and labor. Lava Flow 5 uses a prefabricated steel structure, like those used by Pierre Koenig and the Case study Houses of California, but was assembled on site in roughly three days – cutting down on labor and material. Lava Flow 7 is a concrete house primarily, built using modular formwork that was reused for several of the different pieces of the building to cut down on costs of material. The flexibility in this construction method cut down on material cost, but also the pre-planning insured that construction time would be quick. This type of construction – using less material and building quicker – does lead itself to a certain type of architecture. One that is both minimal and modern. Of course Tropical Modern homes are built with different budgets, so this is not a universal rule, but the point is that economics are a significant factor when discussing a building design. It is

[32] Seckel, *Hawaiian Residential Architecture,* 4
[33] Powers and Richardson, *Living Modern Tropical: A Sourcebook of Stylish Interiors*, 8-9
[34] Seckel, *Hawaiian Residential Architecture,* 5

also not a regional rule, prefabricated or expedited constructed homes are built commonly around the world. One would think though, that because it is more likely than not, that homes and buildings in the tropics would more readily use an innovative construction system.

> There is, however, one economic point of difference between Hawai'i and the mainland. In those areas where most building takes place, land in Hawai'i is much more expensive than comparable sites on the mainland. A Honoluluan spends an unusually high percentage of his budget for his lot. He has relatively little left over for his house. It is common also in Hawai'i to build on rented land. This too acts as a deterrent to a large building investment. The Hawaiian house, therefore, tends to be somewhat smaller than the mainland house. Yet this difference is not sufficiently marked to produce a recognizable Hawaiian type of residence.[35]

Climate

It is essentially to protect himself from the elements that man builds at all. It is not odd then to find the results strongly influenced by the climate, and unusual climates tend to evoke unusual architecture. In Italy, for example, warm Mediterranean coastal regions lie but a relatively short distance from the snowbound settlements of the Alps. The extreme difference in the architecture is testimony to the effect of climate.

Few places in the world have as mild and even a climate as Hawai'i. Situated in a southern latitude and cooled by ocean currents, it enjoys weather that approaches the ideal. The meteorological records of Honolulu, maintained since 1906, list no temperature lower than 56 nor higher than 89 (We have since had a record high of 100 degrees Fahrenheit in 1988). Mean temperatures throughout the year are entirely in the seventies with excellent humidity conditions, continual breeze and high incidence of sunshine combined with cloud-studded skies. A climate such as this could be expected to induce the development of a special architectural type. Yet, in spite of this, there are aspects of the climate that act negatively upon the development of a characteristic architecture.

In the first place the climate is too good. Extreme climates exert compelling pressures such as are reflected in the architecture of India and Scandinavia. The Hawaiian climate invites a special type of building but it does not compel one. In the past, Islanders have built such anomalies as pseudo-Normandy chateaux and pseudo-Moroccan casbahs. The climate demanded neither, but it permitted both.

Furthermore, the Hawaiian climate never relates to any two houses in exactly the same way. The trade winds blow most of the time but they do not blow all of the time. Kona winds in the opposite direction, though relatively infrequent, not only exist but are characteristically rain bearing. This in itself would simply constitute a dual condition but in relationship to the accidented terrain of the islands it constitutes a great variety of conditions. The directions of slope, view, sun, Kona and trade winds occur in an infinite variety of

[35] Seckel, *Hawaiian Residential Architecture,* 5

> combinations. This works against the development of a single characteristic building type such as might occur if these conditions always prevailed in the same relationship….
>
> But, by and large, the climate is bland and one can live out of doors in Hawai'i more than in other places. Here, again, the Hawaiian is favored by nature. In most places where the climate is favorable to outdoor living one is plagued by a teeming and troublesome animal world. Try living out of doors in the West Indies or in Southeast Asia! Hawai'i is fortunate in having neither monkeys nor snakes nor an aggressive insect population. The Hawaiian insect lives and lets live and man is permitted – in relative comfort – to share the outdoors with him.
>
> Hawai'i's climate is sufficiently special to encourage a regional manner of living and a regional architecture. It is not sufficiently uniform to produce a single well-defined type of residence. It is sufficiently special to favor the development of a regional architecture but it is insufficiently extreme to force it.[36]

It is true that because of the mild climate of the tropics, most building types work here. Furthermore with the affordability of air conditioning, buildings can take any form with any amount of openness to the environment. The climate permits most anything. However, just because anything could be built, doesn't mean that it should be built here. That is part of the argument that Seckel puts forth, is that even though all of these factors are so benign here in Hawai'i and most of the tropics, it doesn't mean that they shouldn't be considered. That is the importance of Tropical Modernism, it does take into consideration these factors and lets those influence and guide the design. As Seckel states, "It is essentially to protect himself from the elements that man builds at all."[37]

> The modern house in a tropical environment must function well, just as a house in an alpine or desert setting must provide a comfortably livable atmosphere in those conditions. But the tropics demand less, in the sense that there needs to be some permeation of the elements to make the house work. Issues of ventilation, direct sunlight and plentiful rain all require a house to be open, elevated, unsealed. So there are certain aspects of modernist design that, although they may have originated in cooler European climates, lend themselves perfectly to the tropics. The open-plan interior allows for the crucial circulation of air and light. A large overhang roof provides a sheltered outdoor living area, shaded from the blazing sun but open to the fresh air.[38]

From this thought, Tropical Modernism could be seen as an ideal typology for the climate. It seems like a perfect pairing – Modernism tries to use minimal structure, material, and enclosure to create space and comfort, the tropics allow this to be possible. That is not to say that architecture here doesn't have to do anything at all and it will create a comfortable climatic space. It is to say that architecture here when designed with the right climatic sensibility can be comfortable without the necessity of mechanical conditioning. As Barreneche explains,

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[36] Seckel, *Hawaiian Residential Architecture,* 5-7

[37] Seckel, *Hawaiian Residential Architecture,* 5

[38] Powers and Richardson, *Living Modern Tropical: A Sourcebook of Stylish Interiors*, 8-9

> Houses in this part of the globe simply have to be different from those anywhere else. In the tropics, architecture must temper the negatives of climate and embrace all that is good about living in year-round sun and warmth: letting breezes flow through the house while protecting against hurricanes, bringing in daylight but not the heat of the tropical sun, creating abundant outdoor living spaces that can be used rain or shine, bugs or not.[39]

Setting

> The topography of the Territory varies enormously. The average house site, however, is on a slope and is consequently subject to two influences. The first of these is that a small hillside plot is usually not conducive to the long rambling one-story house that is currently popular on the mainland. It is conducive, rather, to the optimum arrangement of house that ingenuity can devise to accord with a complicated set of conditions.
>
> The second is that the hillside site is often possessed of a superb view. Its full exploitation becomes an important factor in the determination of the house layout. Architecture, furthermore, is designed consciously or otherwise to accord with its surroundings. It is designed for sunshine or gray skies, for mountain or plain, for garden or desert, for space or for congestion. For example, the silhouetted gothic architecture of England, France, Flanders and the mountainous regions of Spain was designed to be seen through a mist. It never flourished in the sunny regions of the Mediterranean. Thus, when a locality is possessed of a particular visual characteristic, one can expect a corresponding note to appear in its architecture.
>
> Perhaps the most characteristic factor of the Hawaiian setting is its flora. On the mainland one usually sees the greater part of a house from the street. In Hawai'i it is characteristically engulfed in tropical and non-deciduous foliage. The carefully arranged façade in full view at the end of an expansive level lawn is rare in Hawai'i. Houses are usually seen only in part and in conjunction with foliage. This luxuriant growth has further importance. Not only does the climate invite living out of doors, but the flora makes it both desirable and possible. Its beauty acts as an inducement to open the house to the outdoors. Its very presence allows this without the sacrifice of privacy. It permits something akin to country living under conditions of extreme congestion and is – or should be – an important factor in Hawai'i's architecture.[40]

The argument holds to be too true, even for Harry Seckel to disagree – the "Setting" of the tropics is one of its most unique aspects. The setting, not meaning just the literal setting – topography and siting – but the vegetation and views of the surroundings are what make the tropics so special. As Powers and Richardson add,

[39] Barreneche, *The Tropical Modern House*, 7
[40] Seckel, *Hawaiian Residential Architecture,* 7

> In a tropical setting, the natural surroundings are understandably a primary influence on the character of a house, whether it is set in the thick growth of the rainforest, or a hillside above an ocean of swaying greenery, or huddled in an inlet, where the steady push and pull of the tide signals the calm passing of time. The sheer scale of tropical flora can appear overwhelming, but that is part of the appeal. And as the modern house has the intention of creating a receptive backdrop to the essential requirements of its inhabitants, the role of nature in the tropics goes almost without saying.[41]
>
> The framing of the view is also a part of the tropical house, since there is likely to be a particular vantage point over water or a valley, or even through dense forest, though it is likely to be a much less formalized sightline than one might find in a more traditional European house. We also consider the way that a tropical house, the interior and the structure might integrate with the natural environment. This integration refers to the way in which the vegetation is allowed to grow inside the house or within its 'outdoor rooms', or the way that greenery outside becomes part of the interior through the use of large glass walls and doors.
>
> Finally, the relationship between the modern tropical house and its environment is everything to do with the setting itself, the way the house is placed with the lush embrace of the jungle, or set apart from but still very much connected to the natural surroundings.[42]

Because of modern architecture's incorporation of the natural environment into its design process and outcome, the buildings cannot be recreated anywhere else than their original setting. The way that Modern architecture does this is not one answered either – there isn't a single rule for how to incorporate the setting – it changes from site to site. Therefore the Tropical Modern houses are all unique due to their setting.

> They are not hermetically sealed, air-conditioned dwellings that could be found in any climate. These are houses innately of their place and open to their surroundings, whether on a pristine beach, a rain-forested mountainside, or in a bustling urban metropolis. Their modern spirit cannot be divorced from their tropical surroundings…[43]

Cultural Background

> There are no historic prototypes in Hawai'i that bear strongly upon present-day building or that are likely to bear upon building in the future. Except for its high-pitched roof, the thatched hut of the early Hawaiian can be discounted as an influence. The first major architectural importation was that of the missionaries who brought from Boston the New England "colonial" dwelling. It is probably because the style was inappropriate to the Hawaiian setting that the importation never became an important traditional influence as it did in the

[41] Powers and Richardson, *Living Modern Tropical: A Sourcebook of Stylish Interiors*, 12
[42] Powers and Richardson, *Living Modern Tropical: A Sourcebook of Stylish Interiors*, 13
[43] Barreneche, *The Tropical Modern House*, 8

> Western Reserve in Ohio and elsewhere. Two classes of building followed. One was the locally developed plantation house which was sufficiently appropriate to the environment to exert a limited influence on what followed. The other was a variety of architectural styles imported from every known climate and epoch. The plantation house was never developed to a sufficient degree of excellence to become a strong tradition. Eclecticism on the other hand never became channelized. No one style ever predominated numerically, as happened in Florida and California where the climate and historic sentiment combined to favor a Hispanic idiom.[44]

As stated before, just because the historical architectural traditions didn't take hold to make a single refined local architecture in Hawai'i, that doesn't mean it didn't happen elsewhere in the tropics. Brazil for example has a history of imported Portuguese type architecture that has not only a cultural sentiment, but also a climatic one. Portuguese architecture ads local culture to both the works of architect Oscar Niemeyer and Marcio Kogan, in their residential designs. As is the work of Studio Mumbai in India inspired by their local architectural building traditions.

> It is not in the locally developed prototype nor in the foreign anachronism, then, that one can expect to find a strong influence on Hawai'i's architecture.
>
> Neither does there exist a strong academic bias as sometimes obtains when all local architects, artists, or artisans have been trained in a single esthetically or intellectually inbred tradition. On the contrary, the local scene is characterized by the presence of men of widely dissimilar backgrounds.[45]

The opposite is true however in Florida with the Sarasota School of design influencing much of the Florida Modern architecture there.

> Sometimes the work of a single man or group will become the basis of a local type. To date this has not happened in Hawai'i.[37]

Vladimir Ossipoff was mentioned previously in connection with this quote from Seckel as a possible opposing argument to this statement of Hawai'i. But in other regions of the tropics, specifically again Oscar Niemeyer's work was truly influential on how the country affiliated themselves architecturally. Glenn Murcutt of Australia has influenced many of his fellow Australians in his concepts of building lightly and climatically.

> Hawai'i's population is predominantly Oriental. What can we infer from this? History teems with examples of architectural styles following the migrations of peoples. Invariably, however, the migrations in these cases came as conquests. The conquerors established themselves immediately at the top of the social and economic systems and imposed their culture – including their architecture – on the conquered, as the Mogul conquerors did in India or as the Moors did in Spain or as the Romans did so widely. This was not the case in Hawai'i.

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[44] Seckel, *Hawaiian Residential Architecture,* 7-8
[45] Seckel, *Hawaiian Residential Architecture,* 8

> Traditionally, then, Hawai'i is singularly free of architectural influences of special character.[46]

This again is the case in tropical countries like Brazil where the Portuguese colonizers brought their architectural traditions and for a while all architecture was built in their style. Because of the location of many countries and areas in the tropics, indigenous nations have been colonized and recolonized by many different cultures. Also the cross immigration of peoples in this part of the world mean that there are no majorities of any one, or two cultures, in an area. There is instead a cross fertilization of different architectural traditions and customs.

> Ethnic groups have brought with them their particular customs. The Japanese traditionally removes his shoes on entering the house, lives with a minimum of furniture, and dines, bathes and dresses in a specific manner. These are special social usages that could evoke a corresponding architecture. For a house is built to live in, and a particular manner of living calls for a particular type of house. The greatest single social factor in Hawai'i, however, is that it is American. It is American socially, politically and emotionally. The Oriental Hawaiian is first and foremost an American. The special customs of ethnic groups are fast dying out. In Hawai'i they are honored by Caucasians and Orientals alike and, being honored, might persist to some degree for sentimental reasons. They are decreasingly important factors, however, in their influence upon Hawai'i's architecture.
>
> The Oriental migration did not introduce an Oriental architecture, and the customs that were introduced are rapidly disappearing. There remains, however, a certain Oriental influence or flavor that is reflected in the homes of both Orientals and Caucasians. Whereas prosperous homes along the Atlantic seaboard are accented with European works of art, this is not the case in Hawai'i. Island residents travel less to Europe and more to the Orient. Works of art are imported primarily from the Far East. When the foreign note of decor is added in Hawai'i, it is almost always Oriental. Aside from this one fact, Hawai'i is singularly free of special architectural or esthetic tradition or background. Overwhelmingly it is the influence of the American mainland that predominates.
>
> There is little in Hawai'i's cultural influences that would tend to promote an architecture markedly different from that of other places in the United States. Neither will her isolation give rise to it. The same is true of her material supply and her economic system. It is essentially in her beautiful subtropical setting and her superb climate that one can find a key to an architecture that could be Hawai'i's own. Yet neither of these exert compelling pressures. They simply constitute a tempting invitation that has not yet been generally accepted.[47]

[46] Seckel, *Hawaiian Residential Architecture,* 8
[47] Seckel, *Hawaiian Residential Architecture,* 8-9

Environmental Living

> Unique domestic customs could in themselves compel a unique type of home. If the environment has not yet engendered an architecture, has it at least engendered a way of life?
>
> Environment has endowed the Islander with the qualities that come with perpetual summer. He is relaxed and unhurried, and he is less prosaic than people from more barren settings. He is casual even to the point of indifference about much that he does. He is notable neither for his punctuality nor his industry, but he is friendly and at peace with himself and the world. Here, then, is an attitude toward life that has regional characteristics. But has a corresponding way of life developed? To what extent does an Islander actually live differently from a mainland American?[48]

As was noted in discussions with clients for the designs at the end of this dissertation, during the day to day lives of people in urban Honolulu one wouldn't know they were living in Hawai'i and instead could be living in any other city in the world. The environment presents itself ideally as a place where one could spend their days at the beach, hiking every weekend, or spending every day in slippers and t-shirts. But modern urban life prohibits us from these opportunities as we are stuck in cold office buildings day in and out, living in high rise apartments with no connection to the natural splendor of the islands.

> The average Islander sleeps indoors, has most of his meals indoors, and spends most of his evenings indoors in much the same manner as people elsewhere. Moreover, his indoors is shut off from the outdoors much as if he lived in a different locale. Certainly his home life shows less regional character than his environment would lead one to expect. He is aligned to a civilization that was not developed in his very special setting. His social and cultural heritage stems from colder climes and grayer skies. He has inherited a set of living habits that were not designed for Hawai'i. Not only has he inherited mainland living habits but he has inherited a mainland type house designed for mainland living. It is true that the seasonally used porch of the mainland is found in many island homes as the lanai of all year use. But, by and large, it is the mainland concept of a house that still predominates. The Islander lives in proximity to sea and mountains of surpassing beauty. He lives near trees, flowers, and shrubbery that are in evidence throughout the year. He lives in an incomparable climate. But he has not yet found the means for fully enjoying all this. To live in full and constant intimacy with his surroundings would require a very special dwelling designed for a manner of living that has not yet evolved. This places him in an awkward position. To live differently he would need a special house, and the special house will evolve only if he lives differently or wants to live differently.
>
> How can one expect a situation like this to resolve itself?[49]

This then is the proposition that Seckel introduces for the Bishop Museum exhibition. The *Hawaiian Residential Architecture* publication then goes into images collected from different

[48] Seckel, *Hawaiian Residential Architecture,* 9
[49] Seckel, *Hawaiian Residential Architecture,* 9-10

houses on O'ahu, particularly of their lanais. Several houses by Ossipoff and one by Seckel, as well as other architects, are shown as examples of design for "environmental living." The houses are all examples of Tropical Modernism, and have little to no enclosure or separation between them and their surroundings. The houses seem to argue against all the points Seckel presents that would not make a unique local architecture. It seems that there are a few architects in his perspective that do understand what it means to design in the tropics, and they encourage through their designs, that their inhabitants enjoy the splendor that is the tropics. In the sections following, examples of both architects and their work will be analyzed in reference to these factors for a regional architecture. How these architects in their different locations in the tropics responded to isolation, material, economy, climate, setting, culture, and environmental living will be looked at in documenting a regional architecture.

Precedent Studies

Hawai'i

The peak of the Modern movement coincided quite conveniently with a huge boom in development and growth for Hawai'i. The war had just ended, Hawai'i was on its way to becoming a state, and technology and population increase meant large changes to the built environment. According to the Historical Hawai'i Foundation,

> This remote island chain in the north Pacific suddenly found itself in the midst of global activity with the advent of passenger jet service to Honolulu and the laying of the trans-Pacific telephone cable, both of which contributed to more closely linking the United Stated with its newest state. Within 30 years, a rural, agrarian society dependent on sugar and pineapple for its livelihood transformed itself into an alluringly cosmopolitan financial hub for the Pacific with the travel industry as its mainstay.
>
> The outside world impinged itself upon the islands to a degree unprecedented in Hawai'i's history. And the population boomed. Between 1950 and 1970 Hawai'i's population more than doubled, the number of automobiles more than tripled, and the number of visitors to Hawai'i's shores jumped from 46,593 to 1,746,970.[50]

This increase in population and a rising and changing economy meant more homes being built on the islands. Architects and developers alike were quick to answer the demand. Architects like "Vladimir Ossipoff, Alfred Pried, Johnson & Perkins, Edward Sullam, Richard Dennis, Frank Slavsky, Albert Ely Ives, and Stephen Oyakawa"[51] started building strikingly modern residences for baby boomers after World War II. These modern homes, built expertly by Japanese craftsmen, embodied elements of the island spirit – open floor plans, lanais and a connection with the environment. They took cues from the Asian cultures on the islands and integrated them into new, modern forms. This boom in residential development added a much appreciated chapter to Hawai'i's architecture

> Similarly, new subdivisions were the products of the automobile's decentralizing tendencies and the expansion of young families. The single wall, plantation housing tradition with its simplicity of line and efficiency of design easily translated into a contemporary statement in harmony with modernist precepts. Suburbanization embraces broad swaths of land with Aiea-Pearl City-Waipahu and Kailua-Kaneohe becoming the fastest growing areas in Hawai'i. Similarly the city sprawled out along Kalanianaole Highway with the development of Kāhala, Aina Haina, Niu Valley, and eventually Hawai'i Kai. Tract homes designed by both builders and architects proliferated throughout the 1950s and 1960s, placing heavy demands on infrastructure systems such as water, sewage, transportation, storm water control, and refuse disposal.[52]

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[50] Historic Hawaii Foundation, *Hawaii Modern* (Honolulu: Historic Hawaii Foundation, 2012), 3.
[51] Historic Hawaii Foundation, *Hawaii Modern,* 15
[52] Historic Hawaii Foundation, *Hawaii Modern,* 15

Among the many architects in Hawai'i associated with Hawaiian Modernism, none is more well-known as architect Vladimir Ossipoff. His work was not limited to just residential design but covered a wide scope of typologies, from office buildings, to private clubs, to institutions, and to spiritual buildings. It is his residences though that helps define the Hawaiian Modern residential typology. His work and life discussed further in the following section helped set the stage for a now highly regarded architectural heritage on the islands.

Fig. 17. Craig Steely, *Lava Flow 5*. 2013, Hamakua coast, Big Island, Hawai'i.

Fig. 18. Tom Kundig, *Slaughterhouse Beach House*. 2009, Maui, Hawai'i.

Ossipoff's work helped pave the path many years later for other modern architects. One such architect is Craig Steely who reignited the Hawaiian Modernism flame on the lava rock fields of Big Island (Fig. 17). Craig Steely, who recently (2014) was awarded two design awards from the Honolulu chapter of the American Institute of Architects, brings a San Francisco, California Modernism approach to his new residences in Hawai'i. They evoke both construction methods of the Case Study houses of California, and the climatic sensibilities of Ossipoff. Set in their barren landscapes of a 1982 lava flow, his 'Lava Flow' series of houses are each studies into different structural methods, climatic devices, and ways of creating outdoor spaces that Steely takes from the vernacular car port. They involve innovative and interesting construction methods, using a system of prefabricated pieces in San Francisco and poured in place concrete elements. His rural studies on the Big Island of Hawai'i have been some of the most publicized residential work coming out of Hawai'i as of lately. Spending his time between San Francisco and Hawai'i, Steely uses lessons he learns in one location and applies them to the other.

Another architect who has reprised the Tropical Modernism movement in Hawai'i is architect Tom Kundig, of the Olson Kundig architecture firm (Fig. 18). Though Kundig has only finished several residences in Hawai'i, their firm is known for their industrial vernacular inspired residences around the mainland US. Based out of Seattle, their work comprises of kinetic and industrial inspired elements merged together in innovative ways to engage the user in aspects of the architecture, and the nature around them. Their work looks to the vernacular of the region and by reprising elements and reusing them to residential needs their work is both modern and rustic. Earthy tones, rusted corten steel, exposed structure, metal fabricated components, and mechanical devices all make up the character of their houses. Kundig's Hawai'i residences don't miss a beat by capitalizing on vernacular forms and incorporating the firm's style and language into climatic, well attuned architecture that well represents Tropical Modernism.

Vladimir Ossipoff (1907-1998)

Overview

Fig. 19. *Vladimir Ossipoff photographed in his office*. 1975, Honolulu, Hawai'i.

The personal history of Vladimir Ossipoff (Fig. 19) is often told in great detail whenever someone tours his buildings for the first time – as if to shed some light on why his architecture has such unique and eclectic manifestations. Ossipoff, himself, represents in many ways the demographic and culture of Hawai'i – even though not born on the islands – and through his masterful skill was able to portray a sense of place in his architecture. His multi-cultural background, his stern nature while at the same time having been quoted for saying, "*We have a much more casual way of being formal than you do on the mainland,*"[53] along with his deep sensitivity and appreciation of nature, makes him one of the greatest representations of not only Hawai'i architects, but the people of Hawai'i.

Vladimir Ossipoff was born in Russia in 1907, but from the age of 10 was raised in Tokyo, Japan. His father was a military attaché for the Imperial Army at the Russian Embassy in Tokyo and the family traveled between the two countries frequently. Because of this multi-cultural upbringing, he received a worldly education in his early years. He was fluent in both languages as well as English as he attended an international school in Tokyo for American children. He was exposed to Japanese culture growing up, not only in Tokyo, but also his family's summer retreat near Mt Fuji and through his nanny that carried for him and his siblings. In 1923, when Ossipoff was sixteen, the Kanto Earthquake hit Tokyo and his family was forced to flee the country. Ossipoff's father had always intended on the family moving to America, as was seen in sending the children to an American school to learn English, the natural disaster was as good an incentive as any to bring these plans to a closer time. Ossipoff, his mother and siblings, boarded a ship for

[53] Dean Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff* (New Haven: Honolulu Acadmey of Arts, Yale University Press, 2007), 93.

California and were forced to leave his father behind. His father tragically died in Japan before being able to rejoin his family. The Ossipoff's then settled in Berkley where they quickly took on American lifestyles. Vladimir Ossipoff graduated from high school in 1926 before attending the University of California where he received a degree in architecture in 1931. He worked for a while in California before going on a trip to visit an old college roommate and high school class mate, Douglas Slaten, in Hawai'i. While there he was encouraged to stay as there were many opportunities for young designers and he quickly was able to find employment at local architecture firms run by California trained architects.[54]

> In 1936, only five years out of architecture school, Ossipoff formed his own architecture firm, Vladimir Ossipoff, AIA (later, Ossipoff and Associates). He enjoyed a successful practice, building for Clare Booth Luce, Linus Pauling Jr. (his Round Top House was an award-winner), the Pacific Outrigger Canoe Club, the Thurston Memorial Chapel at Punahou Schools, the Hawai'i Preparatory Academy, the University of Hawai'i, and IBM. While he did not specialize in domestic architecture, he did complete a large number of suburban homes around Honolulu; these works in particular received attention within the mainland American architectural press.[55]

Ossipoff's history in Japan, California, Russia, and Hawai'i come across in his architecture. As if some poster child for the new demographic of Hawai'i during midcentury – people raised elsewhere but made their way to Hawai'i either through California or Asia – Ossipoff called Hawai'i his home for the remainder of his life. His legacy is long lasting and only ripening as the years go on. From solo exhibitions of his work at the Academy of Arts in Honolulu, to documentary films and crowd funding campaigns to preserve his documents, Ossipoff, is one of the only architects in Hawai'i to be a household name.

Comparison to Factors

Culture is one of the factors for a regional architecture presented by Harry Seckel, along with is also climate, setting and environmental living – all of which Ossipoff was a master at. But because he was working and featured in Seckel's publication, *Hawaiian Residential Architecture,* there has been much comparison between Seckel's publication and Ossipoff's work.

> Within the context of Hawaiian architecture at mid-century, Seckel's writings revealed a real tension between those who integrated with a broad American design culture, and those who maintained a separate Hawaiian identity. Yet, as Seckel argued, Hawaiians tried to be "socially, politically, and emotionally" American. Hawaiian architecture, particularly public buildings, found itself within a decidedly American tradition. Architects practicing in Hawai'i in the first decades of the twentieth century were decidedly influenced by high-style architecture of the eastern United States; by the middle of the century, western trends (linked to developments in California) with "oriental" inflections rose to prominence. With campaign for Hawaiian statehood (achieved in August 1959),

[54] Monica Michelle Penick, *The Pace Setter Houses: Livable Modernism in Postwar America* (Austin: ProQuest, 2007), 159.
[55] Penick, *The Pace Setter Houses: Livable Modernism in Postwar America*, 159

designers who were creating an architectural image for Hawai'i had vested interested in establishing a cohesiveness. They feared being identified in the architectural press and professional as an "other." Yet these same architects, Ossipoff included, were equally interested in marking the distinct identity of Hawai'i. Specifically, this group advocated the creation of a "Hawaiian idiom," if only for the Hawaiian dwelling. According to Seckel, vernacular architecture in Hawai'i should have developed in regards to its isolation, native materials, economic conditions (cost of labor and extreme expense of land), climate (mild but with many microclimates), varied topographical setting, and culture. Seckel argued – perhaps controversially – that these factors failed to influence Hawaiian architecture in any dominant way.

Yet Seckel recognized a crucial force in the formation of Hawaiian residential architecture: "environmental living." As he described, the "island attitude" had generated a certain kind of lifestyle, and thus given ties to a responsive domestic architecture. The "perpetual summer" of Hawai'i fed a way of life that was relaxed, unhurried, and "casual even to the point of indifference." Even with this dominant culture of ease, argues Seckel, Hawaiians inherited living habits, specifically from the United States eastern seaboard, that were not designed for their environment. Until the 1940's according to his assessment, Hawaiians did not have a type of house that was particularly suited to Hawaiian life.[56]

It seems then that Ossipoff was one of the few architects in Hawai'i who sent off to do that – create a home for the Hawaiian way of life. For most of Hawai'i's residential architecture, as Seckel points out, factors like culture, local materials and economic conditions of a project didn't seem to have a real effect of creating a Hawaiian regional typology. Ossipoff let these factors influence him, and in most cases, let them be the driving force for the design. Incorporating local materials in innovative ways, using Japanese carpenters and humble construction techniques for his designs, and incorporating his Japanese upbringing with the Asian heritage of the islands to create culturally responsive architecture. "Environmental Living" was not the only factor that makes Ossipoff's houses well suited to the region.

Climate

"An architect from Ceylon once said that in his country the ideal house is an "umbrella" which protects the dweller from both sun and rain. This is a distillation of an idea to its simplest expression, and I like it. A house in Hawai'i would do well to observe this simple dictum."
Vladimir Ossipoff, speaking of Geoffrey Bawa, 1977

Vladimir Ossipoff's best residential designs well illustrate Geoffrey Bawa's axiom likening a house to an umbrella. The comparison evokes the minimal protection needed to shelter a Hawaiian home from the elements while integrating it with

[56] Penick, *The Pace Setter Houses: Livable Modernism in Postwar America*, 161-163

> its surroundings, a balancing act that Ossipoff mastered as his practice matured.[57]

Despite, or rather in great mastery, Ossipoff's houses are both at once environmental and climatic machines and beautifully crafted works of art. Working with great sophistication, Ossipoff's houses respond to the many different microclimates of Hawai'i in many different ways. Through the general idea, borrowed from Geoffrey Bawa, that the house be like an umbrella with a well-insulated roof, to incredibly complex and innovative strategies for passive cooling and ventilation, Ossipoff's houses, still to this day, are comfortable houses to dwell in. His Liljestrand residence, well-known and publicized as a masterpiece of Hawaiian Modernism, is a perfect example of Ossipoff's climatic sensibilities. As Barreneche describes,

> All of the home's elements were a direct response to the tropical climate, the structure a giant umbrella protecting against sun and rain, he made sure the many operable windows were aligned to catch the prevailing breezes, allowing the entire house to be natural ventilated. Deep roof overhangs were meant to shade large expanses of glass that opened up the upper level living spaces to the views. The wraparound decks, meanwhile, shaded a lower-level recreation room and provided enough protection from daily rain showers that large sliding glass doors could be left open during even a heavy downpour.[58]

Fig. 20. Vladimir Ossipoff, *Liljestrand Residence*. 1952, Makiki Heights, Honolulu, Hawai'i.

The Liljestrand house (Fig. 20) wasn't a onetime occurrence in passive climate control in his architecture, for Ossipoff at this time, sustainability was a necessity in design for the islands. He practiced sustainable architecture in all of his residences. He developed innovative elements and strategies in his architecture to deal with the many microclimates of Hawai'i. As curator of the *Hawaiian Modern* exhibition of Ossipoff's work at the Honolulu Academy of Arts, and local architect Dean Sakamoto describes,

> In his residential designs Ossipoff manipulated different functional spaces to confront these different climatic conditions. For example, interior areas that require a greater degree of enclosure, such as bedrooms and service spaces, are used as buffers from prevailing winds. Two basic architectural elements typically resolved the conflicting needs of openness, protection, and privacy. The first is the broad eave overhand. The second is the sill vent, which consists of a projecting bay with a fixed glazed window; the underside of the bay is left open, outfitted with a set of louvers and a screen to admit the breeze but not the rain. These strategies allowed Ossipoff to build houses that achieved a perfect

[57] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 107
[58] Barreneche, *The Tropical Modern House*, 17

> balance between protection from and permeability to the natural elements and views.[59]

The many microclimates of the islands are due to the geography and topography of the land mixed with prevailing weather patterns of the Pacific. Trade winds that blow from the North East during most times of the year bring cool, moisture laden air from the Pacific Ocean. On islands like O'ahu, this moisture rich air is blown against the Koʻolau Mountain Range, squeezing out the moisture in the form of rain. This creates distinct microclimates not only on the windward and leeward sides of the islands, but also the mauka and makai sides as well. The rain falls the heaviest on the windward mauka area and tappers off as it rolls over the mountains almost diminishing by it reaches the makai area of the leeward side. So within one ahupuaʻa, there could be a climatically very wet area filled with consistent rains, and a rather dry area that receives little showers. But there are also Kona Wind days, where Southern winds bring humid air filled with "vog" from the volcano on Big Island. The topography of the islands sometimes leave some areas in a drought, and others with chances of flash flood warnings. Ossipoff had an understanding of the weather patterns and microclimates of the islands. Houses by the ocean where open air to let the salty humid air be blown out with cool breezes coming in off the ocean. Houses in the mountains controlled wind flows and kept interior spaces dry against harsh mauka showers. Each house has a unique response to the climate of the area.

Setting

> Some consider the word 'tropical' merely to imply a setting, like a stage set, rather than something that has a real effect on a building… It is a word that too often suggests a passive condition, as if any house dropped down amid palms and mangroves will become somehow tropically inspired. But the setting is part of a relationship that house has with its environment – how it is 'set' within the landscape, as much as what surrounds it. And setting is about whether it lies hidden by foliage, within a verdant embrace or set high above the treeline so that the inhabitants always have a clear idea of their place in nature.[60]

Ossipoff was well aware of the setting of the topics, and not only used the varying topography and vegetation of the tropics to influence the actual siting of his architecture, he also used it as a journey of hide and reveal. At the Liljestrand house (1952), as well as his Pauling house (1957) (Fig. 22), Ossipoff uses the long driveways and tall vegetation as the beginning of a precession leading up to the spectacular views of Honolulu bellow. The experience arriving at the Liljestrand house starts during your drive up Tantalus Mountain further down than the residence as the valley starts to engulf the roadway. The view remains hidden, far into the driveway (Fig. 21), and it isn't until you leave your car, enter the house, and step into the living room that the panoramic view of Western O'ahu is revealed to you. To most clients, the view is what they pay for in a site like this, but Ossipoff and the Liljestrands knew, that a view like this must be framed and appreciated, savored, rather than exposed and overplayed. This subdued

[59] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 107-108
[60] Powers and Richardson, *Living Modern Tropical: A Sourcebook of Stylish Interiors*, 16

control over setting, procession, and journey was something that again he planned for in many of his houses.

Fig. 21. Vladimir Ossipoff, *Liljestrand Residence Driveway*. 1952, image 2013, Makiki Heights, Honolulu, Hawai'i.

Fig. 22. Vladimir Ossipoff, *Pauling Residence*. 1957, image 2006, Round Top, Honolulu, Hawai'i.

> Ossipoff demonstrated that the ideal island home should be understated, not ostentatious or imposing. He also thought that a Hawaiian house should emphasize its connections to the environment through topographic integration and ease of movement between inside and out. Grand scale, solid forms, and bright colors were not part of Ossipoff's domestic design vocabulary. Rather, an Ossipoff residence enables passage through and views from the house's site and surroundings. Although he made ample room for his client's requests, his designs were governed by his principles of modest scale; responsiveness to landscape and microclimate; and the unveiling of a site through movement. Inscribed within this experience of a house and its setting is an element of surprise. The approach to an Ossipoff-designed house is always carefully considered. Pathways to entries are never direct but create moments of delight both simple and grand, often framing views beyond. By midcentury, Ossipoff's firm belief that a dwelling should be shaped by climate and site produced remarkably sensitive homes that established a foundation for significant work in the following decades.[61]

Culture

Culture is a significant factor for Ossipoff's designs. Though his work doesn't scream one culture, or any culture particularly loudly, his understated elements and cues to Asian, California, and Hawaiian local culture come through in his designs. Because he himself was multicultural, perhaps it was inherent and a subconscious effect that people can find references to other places and times.

[61] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 107

Fig. 23. Vladimir Ossipoff, *Goodsill House*. 1952, image 2006, Wai'alae, Honolulu, Hawai'i.

Fig. 24. Vladimir Ossipoff, *Goodsill House, view from living room to dining room*. 1952, Honolulu, Hawai'i.

Born in Vladivostok, raised in Tokyo, and educated at Berkeley before moving to Honolulu in the 1930s, Ossipoff himself embodied the multiculturalism present in his architecture. His houses synthesized Hawai'i's polyglot culture and lush, tropical environment in distinctly modern terms, putting a contemporary spin on elements of traditional architecture such as the lanai. In the book *Hawaiian Modern: The Work of Vladimir Ossipoff*, noted architectural historian Kenneth Frampton characterized Ossipoff's work as "sophisticated eclecticism." The Goodsill House (Fig. 23-24) in Honolulu's Wai'alae district (1952), for instance, revels a mix of influences. The single story layout is a classic American 1950s ranch house; low-slung tile roofs and sliding doors suggest traditional Asian architecture; and the open-air living area at the heart of the home is an updated version on the archetypal Hawaiian lanai.[62]

[62] Barreneche, *The Tropical Modern House*, 15-17

Fig. 25. Vladimir Ossipoff, *Liljestrand Residence*. 1952.

Fig. 26. Vladimir Ossipoff, *Liljestrand Residence, exterior lanai*. 1952, image 2013, Makiki Heights, Honolulu, Hawai'i.

Fig. 27. Vliaadimir Ossipoff, *Liljestrand House, the exterior circulation acts as an engawa from traditional Japanese design*. 1952.

Ossipoff's houses feature many elements originally associated with Japanese traditional architecture – sliding screen doors, wooden grills, and transitional spaces between indoors and out (Fig. 25-27). This might be due to his time in Japan, or his personal thoughts on Japanese and tropical architecture. As Dean Sakamoto explains about his Japanese cultural history,

> … Perhaps because of his upbringing in Japan, Ossipoff brought with him the perspective of another culture whose vernacular architecture demonstrates a persistent and integral relationship to nature. Growing up in a traditional Japanese house, he knew firsthand what worked, what did not, and how Hawai'i's climate could be advantageous to Japanese domestic traditions.
>
> In this regard, many years later, Ossipoff stated that the Hawaiian climate was better suited for the Japanese house than was that of Japan itself. In the same article – which was published in *Hawai'i Architect* in 1986 – he qualified this statement in terms of the Japanese house's layered enclosure, noting that the design is ideal for Hawai'i's warm year-round climate, while useful only during Japan's warmer seasons and ineffective against its cold winter weather. In passing, Ossipoff mentioned the *engawa*, or veranda platform, a key component of the Japanese house that functions much like the Hawaiian lanai. Historically, the *engawa* was characteristic of the *shuden* residential style of the late Middle Ages. It typically circumscribed the interior courtyards and exterior perimeter of larger domestic structures and functioned at once as a passageway and a place for indoor-outdoor activates. Ossipoff also described the layers of

> sliding panels – *shoji* (paper and wood screen) and *amado* (wood shutters) – that open and close the engawa to nature. Clearly the traditional Japanese house was structured for its inhabitants to dwell *with* nature rather than resist it; Ossipoff innately understood this attitude and transferred these elements to Hawai'i, with its hospitable climate and tradition of making buildings that are essentially part of nature. In Ossipoff's hands a simple vernacular structure, modern design principles, and two cultures' approaches to the integration of architecture and nature were combined to create a new form for contemporary Hawaiian architecture.[63]

The Liljestrand Residence (Fig. 27) again is a prime example of the Japanese references in Ossipoff's work. The engawa space that wraps around one wing of the house connects the second floor bedrooms and office with the outdoors while protecting it and the recreation lanai bellow from the rain and sun. The sliding wooden louvered doors as well as the carpentry details all have Japanese cues to them. Ossipoff's residential architecture having many influences from Japanese architecture expanded past the Liljestrand residence however. As Marc Treib explains about his sound argument for thinking the Japanese house was better suited to the tropics,

> Given the temperature differentials between winter and summer in Japan, the environmental performance of a house with sliding walls of paper and thick roofs of thatch is less than ideal. By the fifteenth century, aristocratic Japan collectively accepted that it was more critical to be cool in summer than warm in winter. The openness of the dwelling maximized the passage of air, while the grass, reed, or cedar-shingled roof – steeply pitched to deflect the rain, and in some areas the snow – provided excellent insulation against the sun's rays. Alas, those very features retarded the passage of solar warmth in winter as well as in summer, rendering the interiors quite cold – and even colder by the air currents that penetrated the gaps in the panels. Sleeping on the floor makes positive thermal performance still more problematic, as any heat produced within the room rises, encouraging chilling drafts. Given Hawai'i's constantly mild temperatures, however, wind movement in the house would be beneficial throughout the year. But, as noted above, Ossipoff was circumspect in his treatment of air flow. Rather than merely maximizing the dimensions of the windows, he relied on pressure differentials to stimulate the movement.[64]

Ossipoff wasn't alone in the creation of the Japanese sensibility in his architecture. Many of his clients and contractors were of, or had ties to Asia. Dr. Liljestrand, for whom had Ossipoff design his house, spent much time in China in his youth – a similar story to Ossipoff's upbringing – Dr. Liljestrand was well adapted to an Asian home lifestyle of living with nature. But "also of note is the fact that Ossipoff worked with Nisei carpenters, who dominated the residential contracting field, to build the houses. These were men with whom he had worked during his prewar practice and who understood the level of quality and craft he expected. Ossipoff's ability to speak Japanese was a huge advantage in this regard."[65]

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[63] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 96
[64] Trieb, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 80
[65] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 110

Environmental Living

When Seckel talks about "environmental living," what he is talking about is the way in which the climate, culture, and setting of the tropics, and particularly Hawai'i, have created a certain lifestyle. The "perpetual summer" of the islands leaves people the privilege of being able to spend more time outdoors. Dean Sakamoto said about Ossipoff's approach to designing and living in the tropics, "His point was, you live in the tropics . . . and if you box it up and air-condition it, you could be anywhere, couldn't you?"[66] In Hawaiian architecture, this lifestyle's manifestation is best seen in the lanai. "As it was originally conceived by native Hawaiians for daily living, social gatherings, and spiritual ceremonies – all of which took place outdoors – the lanai was a freestanding, open-sided, post-and-beam wood frame with a roof of thatch or dried leaves."[67] Ossipoff is known for his great contribution of reimagining the lanai as a building form itself. Reinterpreted by his predecessors as being an addition onto colonial style houses in the form of a patio or a veranda, Ossipoff saw it as a typology in itself. What this led to were pavilion-type houses and open-air buildings for public use. They minimally provided refuge from the hot tropic sun and sudden downpours in an otherwise mild and comfortable climate. But it was Ossipoff's perpetuation of Island living through his architecture that make him most successful. There is a certain lifestyle that is needed for his architecture. Often, his buildings do not work climatically if they are shut off from the elements – too often they are due to unknowing inhabitants that reoccupy the buildings after the original owners have left. But to those enlightened clients of Ossipoff and to the free island living people that enjoy Ossipoff's buildings, the space's he creates nurture this appreciation of environmental living. Louis Mumford once wrote an essay on Honolulu in 1938 entitled *Whither Honolulu?* In it he talks about the natural resources, atmosphere and character of Honolulu. Also he discusses the regionalist ideas, similar to Seckel's take on the Island's environmental living. Karla Britton discusses in *Hawaiian Modern* the comparison between Seckel and Mumford's ideas and how Ossipoff's work made these ideas a reality.

> Perhaps the most obvious evocations of Mumford's regionalist ideals in Ossipoff's work are in the outstanding examples of his residential architecture. While these works receive focused discussion elsewhere in this volume, it is nevertheless important here to take stock of the particular way in which the houses contributed to the development of a Hawaiian way of life, which as envisioned by Mumford would make the built environment serve as an intensification of the drama and creativity of human life. In a pamphlet produced to accompany an exhibition in 1954 at the Bishop Museum, Honolulu, entitled *Hawaiian Residential Architecture,* the architect Harry Seckel argues that up to that point, a local architectural idiom appropriate to the Hawaiian setting had yet to emerge. What had prevailed instead were either superficial Polynesian of "facile oriental" influences, or simple appropriations of mainland-type houses superimposed upon the older tradition of the New England colonial style brought by the missionaries. The idea in people's minds, Seckel argues, was simply "to create an atmosphere" that would be indicative of what was understood to be "the local scene." Contrary to these rather unimaginative instincts, Seckel contended that a truly indigenous Hawaiian architecture would have to reflect what he called "environmental living," which he argued, "implies

[66] Barreneche, *The Tropical Modern House*, 17

[67] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 93

> living in accordance with a particular local environment and required a dwelling designed accordingly." He saw in the work of several contemporary architects – Ossipoff among them – hope that such a regional style was evolving.[68]

Ossipoff's work does perpetuate this idea of environmental living. Through his integration of the other factors for regional design, like climate, culture, and setting, he was able to create houses that were at one with their surroundings. Glass walls that orientated to view channels, special windows that captured prevailing winds, and a close connection with the nature and vegetation of the site created a lifestyle for his clients where they knew they were a part of nature. The way his buildings play with the topography and have seamless connections between indoors and out made his open lanais pleasant areas to be in.

> In light of Seckel's argument however, the importance of these elements is more than simple a successful combination of certain specific restraints and opportunities offered by the local context. Rather, Ossipoff was able to create an architecture that escaped the more typical superficial appropriation of the various cultural influences of Hawai'i, all the while shaping the lifestyle of his client into a pattern that is in harmony with the land and climate by the deliberate embrace of its distinctive characteristics. Ossipoff's houses, in other words, are able to shape the life that is lived within them in a manner that is consistent with their location, effectively creating a regional identity by the success of their own design sensitivities. It is this interweaving of social, cultural, environmental, and architectural elements in such a way as to produce an effective "stage set" for living that makes Ossipoff's houses so reflective of a Mumfordian ideal, and that allows them to maintain the contact with "earth, air and sky," which Mumford so enthusiastically celebrated in his study of Honolulu.[69]

Comparison to Modernism

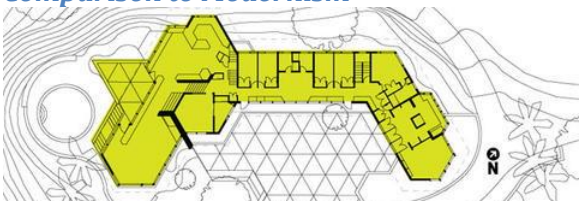

Fig. 28. Vladimir Ossipoff, *Pauling House, floor plan showing triangular module*. 1957

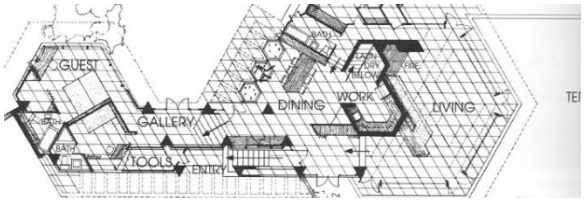

Fig. 29. Frank Lloyd Wright, *Hanna House, Partial floor plan showing hexagon module*. 1937

Ossipoff's reimagining of the lanai or further exploration as the lanai as a building type fit well with other Modernist ideas. The lanai itself being a minimal structure consisting of a roof with four posts was similar to other ideas being presented by his contemporaries. This wasn't just a coincidence, as Ossipoff was well educated and aware of the work by other modern architects. As Dean Sakamoto explains about Ossipoff's influence of other modernist architects on the Hawaiian lanai,

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[68] Karla Britton, "Honolulu: Toward a Regionalist Design," in *Hawaiian Modern: The Architecture of Vladimir Ossipoff* (New Haven: Honolulu Acadmey of Arts, Yale University Press, 2007), 136.
[69] Britton, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 136

In addition to embodying a hospitable quality, the lanai building is modern in it expression of structure and space. Although Ossipoff's Thurston Chapel and Pauling House (Fig. 28) clearly reveal the influence of Frank Lloyd Wright (Fig. 29) – the former primary through its placement in the landscape, the latter for its geometry – his modern lanai concept owes more to the vision of Le Corbusier, whose work Ossipoff also knew. At the ground plane, the spatial principle of Ossipoff's modern lanai is similar to Le Corbusier's archetypal Dom-ino House project (1915) (Fig. 1), in which he demonstrated the "free plan" allowed by reinforced-concrete frame construction, which had been developed recently. The new building technique eliminated the need for space-restricting masonry load-bearing walls and made the placement of interior walls a matter of choice for multistoried designs. In similar fashion, Ossipoff's modern lanai is an open plan capable of infinite variation within the same structural system but without the need for the exterior enclosure (and rarely the upper floor) that Le Corbusier's Dom-ino House presumed.[70]

Fig. 30. Vladimir Ossipoff, *Blanche-Hill House.*

Fig. 31. Vladimir Ossipoff, *Blanche-Hill House, view of guest wing, left, and lanai-living wing, center*. 1961.

Fig. 32. Vladimir Ossipoff, Blanche-Hill House, detail of sliding panels. 1961, Kāhala, Hawai'i.

Ossipoff's other work outside of the lanai also had obvious influence of other architects of the time. In his Blanch-Hill house that he worked on in the Honolulu neighborhood of Kāhala (Fig. 30-32), the house is an open-air all-white pavilion-like house that stretched out and faces the ocean.

[70] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 94

> The house's general openness, its flat roof, and its nearly all-white color scheme were reminiscent of the domestic work of another modern master, Ludwig Mies van der Rohe, in particular, his Farnsworth House (Fig. 4) in Plano, Illinois (1951). But upon further evaluation, the Blanch Hill House differs in its relation to the environment and its non-Western cultural references. First, while both houses were built on raised floor slabs, just over a foot above grade, evoking a feeling of both connection with and detachment from nature (a practice common to Japanese vernacular architecture), at the Hill residence Ossipoff created a platform for both viewing purposes and the prevention of floodwater from entering the house (Fig. 30). Second, the lanai-living area was enclosed not by walls but by a system of sliding panels: Louvered wood shutters, glass doors, and screen (Fig. 32). While the "walls" of the Farnsworth home are famously transparent, the plate glass is fixed, reinforcing a disjuncture with the house's environment rather than creating the direct physical connection that the Hill House allowed. As in the engawa, Ossipoff created a subtropical stage for dwelling within nature with a layered vertical enclosure. Here, though, he applied the concept using modern material in an ideal climate.[71]

But this connection to nature, as opposed to the stark modernism of the European masters, was also seen in other architects of the time – namely houses in California. The work of Richard Neutra and Frank Lloyd Wright also had climatic responses in their architecture that were carried out in modern forms. Ossipoff's climatic strategies were uniquely tropical, or uniquely more Hawaiian than those in California.

> Ossipoff's Liljestrand House (Fig. 25-26), on a hilltop in Honolulu's lush Makiki Heights neighborhood, has a more mid-century California feel: red-hues wood siding, stone fireplaces, timber ceiling, and cantilevered outdoor walkways and terraces from which to take in sweeping views of metropolitan Honolulu and the Pacific, a thousand feet below the wooded ridge. But aping Northern Californian architecture was hardly the point of Ossipoff's design.[72]

Ossipoff had a unique sensibility to his work that made it at harmony in Hawai'i. Maybe perhaps the diverse cultural makeup of Hawai'i reflected his own multiculturalism, which made his work so representative of the place. Or perhaps it was his firsthand experience with Japanese architecture that led to direct architectural strategies for the tropics. Japanese architecture had influenced other Modernist of his time, but that was through second hand publications of the Katsura Villa, or reinterpretations of a Japanese tea house recreated at World's Fairs. Ossipoff was lucky enough to not only grow up in a Japanese traditional home and bring that experience to Hawai'i – he was also able to help recreate the refinement thanks to the help of Nisei carpenter. Or perhaps it was Ossipoff's appreciation of nature that made his work last to this day so comfortably. His strategies for siting a house and incorporating passive elements for ventilation and view channeling are consistently works of brilliance. His work has inspired many architects and designers in Hawai'i and around the world.

[71] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 99
[72] Barreneche, *The Tropical Modern House*, 17

Florida

Tropical, and subtropical, modernism is synonymous with the early and midcentury work of architects in Florida. Bauhaus trained, or trained under the lineage of Bauhaus associates like Walter Gropius, architects saw that the European Modernism was better suited to the tropics than it was the its colder climatic origins, and adapted its open plans and indoor-outdoor associations to the easy-living lifestyle of Southern Florida. Frank Lloyd Wright started doing work himself in Florida in the yearly 1940s (Fig. 33-34). His integration of site, nature, and emphasis on the horizontal plane in his architecture responded quite well there in Florida. It, in turn, inspired a generation of modernist architects in Florida that would reinterpret the lessons put forth by Wright in setting and climate, but reimagine architecture with the structural clarity and purity of Gropius. Though this section of this essay only points out one architect of the Florida Modern era, Paul Rudolph, it is to be understood that because of the proximity of Florida to the rest of the US, as well as South America, modern architecture here did not happen in a vacuum and not by a single individual – it was in the end, the culmination of a collective of architects and their legacy, some of whom never visited Florida but whose work influenced those within. As Hochstim explains in the book *Florida Modern*,

> The unique character of modern residential architecture in Florida during the quarter century after the Second World War was created by a small group of talented architects and their daring clients who were willing to challenge conventions and embark on a novel way of enjoying the state's subtropical lifestyle. Embracing the underlying principles of modernism, rather than its overt expressions, the architects responded to the changing needs of family life and demands of the climate with ingenious spatial organizations and inventive use of new construction technology. Thus in their direct response to local conditions, Florida's modern houses differed significantly from residential designs in California and other parts of the United States.[73]

This is true about any architecture that can be labeled as regionalist architecture – it responds to local conditions and creates a unique set of manifestations that couldn't exist in any other place. But the Florida Modernism was not just limited to one typology. Frank Lloyd Wright's first work in Florida was the Florida Southern College (Fig. 33-34), in central Florida. Envisioned as the college of tomorrow, it holds the largest collection of Wright designed buildings anywhere in the World. With its connections to the setting and the nature around it, it reshaped the local conviction on what types of architecture were best suited to the region. The styles most commonly associated with architecture during the post-war boom in Florida were of Mission, Mediterranean, or Spanish styles[74] - architecture that may have originated in hot and humid locations, but were not necessarily chosen for the climatic considerations, but for their inherited sense of age. Housing markets desired stability for their consumers, but when whole subdivisions were built new, they had to deliver them with the illusion of age, rather than the promise of better living. The housing market in post-war Florida was also unique for other reasons, as Hochstim explains about residential architecture in Florida as opposed to other typologies,

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[73] Hochstim, *Florida Modern*, 17

[74] Christopher Domin and Joseph King, *Paul Rudolph The Florida Houses* (New York: Princeton Architectural Press, 2002), 41.

> … No building style or type better reflected Florida's unique climate and lifestyle than the emerging modern residential designs. Like California, Florida made the integration of the indoors and outdoors not only possible but also desired, especially in smaller homes, where outdoor space could make the house feel much larger. But unlike California, Florida is inhospitable for five months a year.[75]

Fig. 33. Frank Lloyd Wright, *Florida Southern College, Seminar Buildings, exterior, façade*. 1940-1946 Image: 1950, Lakeland, Florida.

Fig. 34. Frank Lloyd Wright, *Florida Southern College. Industrial Arts Building*. 1952 Image: between 1952 and 1953, Lakeland, Florida.

Most of the residents of Southern Florida were therefore only there for several months out of the year, this created the opportunity for architects to create new, experimental architecture for them that liberated the owners from their busy lives up north. The warm climate and the liberal, new age thinking clients created the perfect conditions for the new modern architecture to thrive. However, as Hochstim explains about the end of this movement,

> With the universal acceptance of air conditioning, the remarkable achievements of Florida's residential modernists came to a virtual end. It terminated the need for innovative designs that channeled breezes through the house and shielded it from solar radiation. Additionally, the introduction of reflective and heat-absorbing glass – a little if any concern for energy conservation – allowed indoors and outdoors to be visually united without the need for physical connection. While a small number of architects continued to create exciting designs incorporating the new climate-control technology, in general, the motivations for unique Florida houses disappeared. What replaces it was the return to eclectic traditionalism. Without the need for a passive response to the climate, homeowners opted for more compact forms that not only satisfied their sentimental attachment to the past, but also were easy to sell in the conservative real estate market. Thus stylistic masquerade, which had long dominated residential architecture, gained even greater legitimacy without any guilt over environmental insensitivity. The irony of this is that modern architecture developed by embracing technological advancements, and yet it

[75] Hochstim, *Florida Modern*, 26

> was technology that largely brought about the demise of the originality of modern Florida houses.[76]

For that time, however, when experimentation in Florida architecture was encouraged it was at the hands of two passionate architects in Sarasota, a resort town in southern Florida.

> In Sarasota, responding to the climatic, economic and cultural conditions of the area, the emerging group of modern architects under the leadership of Ralph Twitchell and Paul Rudolph, began to produce significant contemporary work, referred to later as the Sarasota School.[77]

Paul Rudolph would later become internationally known for his architecture along the East Coast of the US, but his career started in residential architecture in Florida with already practicing architect and builder, Ralph Twitchell.

[76] Hochstim, *Florida Modern*, 27-28
[77] Hochstim, *Florida Modern*, 23

Paul Rudolph (1918-1997)

Overview

Fig. 35. *Paul Rudolph*. 1950, Siesta Keys, Florida.

The rising-star trajectory of Paul Rudolph's (Fig. 35) history reads like a "who's-who" of modernist architects. With affiliations to Walter Gropius, Le Corbusier, Philip Johnson, I.M. Pei, Frank Lloyd Wright, Oscar Niemeyer, Richard Neutra, Ralph Twitchell and many architects in Florida, it is easy to see his many different influences from his peers and predecessors influence his own work. Peter Blake explains about how this made Paul Rudolph's work so unique however,

> Unlike any other architect of his generation, Paul managed to reinterpret all the important lessons learned from the likes of Mies and Wright and Corbu and recast them into his own molds… He was, I think, the one direct descendant of, the one heir to, the work of what Alison and Peter Smithson like to call the 'Heroic Period' of modern architecture.[78]

It is true that Rudolph's long career made him and his work quite well known nationally and internationally and was one of the last "star" architects of the modern period. Although

[78] Domin and King, *Paul Rudolph The Florida Houses,* 25

Rudolph's own history is spotted with other famous modernists of his time, Rudolph's work was very much his own and it is through his unique sensibilities to these outside influences that he was able to distil such responsive and pure architecture. It is even more apparent in his early work in the residences he built in Sarasota, Florida, where his career began. This period of Rudolph's work was especially known for his regionalist sensibilities, as he, himself, was a Southerner and had grown up in the climate and vernacular architecture of the region.

> Born on October 23, 1918 in Elkton, Kentucky, Paul Rudolph spent most of his childhood in various towns in that state. In the itinerant tradition of the Methodist church, his father, a minister, periodically moved the family from assignment to assignment, and young Paul observed and lived with the vernacular architecture of the American South.[79]

This upbringing was then later paired with an education in the Southern vernacular. As Joseph King explains,

> Rudolph Studied architecture at the Alabama Polytechnic Institute (now Auburn University) from 1936 through 1940, when he received his Bachelor of Architecture degree. In his youth and in college, he developed a thorough understanding of the means to deal with the climate and physical environment in the South. At Alabama Polytechnic, the specific mechanisms of climate control in the local vernacular architectural tradition were a subject of academic documentation and analysis, particularly by Professor Walter Burkhardt, who led the Historic American Buildings Survey in Alabama. Burkhardt's work documented such devices as adjustable shutter and awning systems that had been developed over many decades and in many different site-specific iterations to catch breezes, provide shade from the sun, and allow for micro-adjustments of climate in interior spaces. Plan and spatial elements such as dogtrots and porches were also being documented and were used, in addition to building forms and construction materials, to mediate climate. The broad experience of Southern architecture would be an important influence in the experiments of Florida houses.[80]

This was his first introduction to the analysis of regional architecture, a practice that he would continue for some time in his career. Walter Burkhardt was also one of the first influences on Rudolph in terms of awareness to climatic architecture. The next influence for the young architect was Frank Lloyd Wright (Fig. 36).

> In 1940 Rudolph had the opportunity to see Frank Lloyd Wright's most current work firsthand. One of the finest of the Usonian houses, the Rosenbaum residence, was built in Florence, Alabama... He experienced for the first time architecture that was vital, meaningful, and modern.[81]

[79] Domin and King, *Paul Rudolph The Florida Houses,* 26
[80] Domin and King, *Paul Rudolph The Florida Houses,* 26
[81] Domin and King, *Paul Rudolph The Florida Houses,* 26

Fig. 36. ***Young Rudolph visiting a Wright house*****. 1940, Rosenbaum Residence, Florence, Alabama.**

Fig. 37. Ralph Twitchell, Twitchell Residence. 1941, Siesta Key, Florida.

Fig. 38. ***Ralph Twitchell at the Healy Guest House (Cocoon House) under construction*****. 1951, Siesta Key, Florida.**

Frank Lloyd Wright's work has a connection to the site and a specific language to it that makes it unique to the American landscape. Its use of natural materials and the articulation of the structure made it architecture of the place. Rudolph was susceptible to the influence of Wright's work and this helped him make his next step in his life.

> A classmate of Rudolph's recommended that he move to Florida and work for his former employer, a progressive architect named Ralph Twitchell. The opportunity to see Wright's Florida Southern College (Fig. 33) in Lakeland Florida, then under construction, was undoubtedly an attraction to west central Florida as well. Rudolph came to Sarasota in 1941 and worked for Twitchell for six months before entering the Harvard Graduate School of Design in the fall. Twitchell was evidently pleased with the young man's design talent, for he was thoroughly involved in the design of Twitchell's own house (Fig. 37). Rudolph, young, inexperienced, and deferential according to his southern upbringing, was nevertheless assertive in his ideas about design and evidently enthusiastic about working with Twitchell…[82]

Ralph Twitchell (Fig. 38) was a seasoned architect by the time Rudolph interned at his office for the summer, but their collaboration for the years to come would create a legacy in Florida. After the internship however, Rudolph moved on to another important step in his life.

[82] Domin and King, *Paul Rudolph The Florida Houses,* 27

> While Rudolph was developing a strong affinity for subtropical Florida, he also found himself in a unique time and place in the master's class at Harvard led by Walter Gropius. He participated in the most current explorations of modern theory and design and experiences a cultural environment that was entirely new to him.[83]

Another prominent figure at the Harvard Graduate School of Design was Marcel Breuer who practiced architecture for some time with Gropius. He would be yet another influence on Rudolph's later work. The way that Breuer creates floating masses set in the landscape, like in his Chamberlain Cottage (Fig. 40), was seen in Rudolph's later work like at the Miller Guest House (Fig. 39). The materiality and composition of the two designs are quite similar, and it is most likely that Rudolph would have seen Breuer's cottage while studying under him.[84]

Fig. 39. Ralph Twitchell with Paul Rudolph, *Miller Guest House (Miller Cottage) exterior*. 1949, Image: 1950-51, Casey Key, Florida.

Fig. 40. Marcel Breuer and Walter Gropius, *Chamberlain Cottage, exterior, west side*. 1940-1941, Image: 1942, Wayland, Massachusets.

Before finishing his master's degree in architecture, Paul Rudolph went on to another important aspect of his upbringing and education – one that would later influence his ideas of structure and construction. After his first semester at Harvard, Rudolph joined the Navy becoming a naval architect positioned at the Brooklyn Naval Yard from 1942 to 1946. It was the onset of World War II, and this opportunity presented him with experiences he wouldn't have in the private sector. His later work could be connected back to his naval experiences. The lightness of their structure, efficiency of internal spaces and the thin enclosing hull, or roof, could all be takeaways from ship construction. He capitalized on construction methods and structures of his time, new assemblies that arose from technologies used in the war. He responded to Gropius's hopes for his students when he said, "What I do want is to make young people realize how inexhaustible the means of creation are if they make use of the innumerable modern products of our age, and to encourage these young people in finding their own solutions."[85]

[83] Domin and King, *Paul Rudolph The Florida Houses,* 28
[84] Domin and King, *Paul Rudolph The Florida Houses,* 29
[85] Domin and King, *Paul Rudolph The Florida Houses,* 30

The clearest example of Rudolph's architecture influenced by naval technology was the 1950, Healy Guest House (Fig. 41-42), or Cocoon House. As Paul Rudolph explains about the Cocoon House,

> It had to do purely with the idea of using the least material possible and making it as light as possible and as efficient as possible and the whole notion of it being structurally clear. I was profoundly affected by ships… I remember thinking that a destroyer was one of the most beautiful things in the world. I still think that. The whole notion of tension structures which you find in ships… because they're light in weight. And then the whole idea of the flexibility of the cocoon. I saw mothballing of navy destroyer escorts especially and how that worked and that was fascinating to be because of its elasticity.[86]

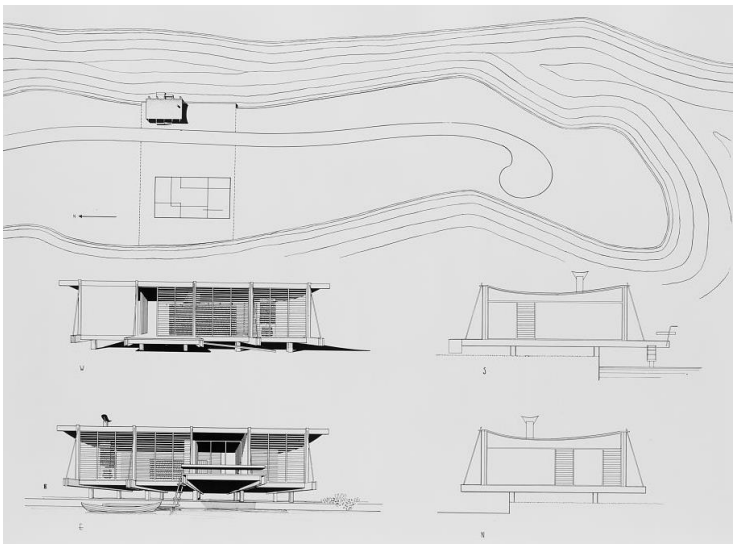

Fig. 41. Paul Rudolph, *Healy Guest House, site plan and elevations*. 1950, Siesta Key, Florida.

Fig. 42. Twitchell with Rudolph, *Cocoon House*. 1950, Siesta Key, Florida.

After his time in the Navy, Rudolph reentered Harvard GSD in 1946 and received his master of architecture just one semester later. In total, he was only in graduate school for two semesters before receiving his degree. Walter Gropius had seen talent in his young pupil, and awarded Rudolph with a traveling scholarship for Europe. While in Paris, Rudolph spent time editing a single issue of the French magazine *L'Architecture d'aujourd'hui,* completely devoted to Gropius's work in the US. Afterwards, he went back to Sarasota and rejoined with his former employer Ralph Twitchell.

Rudolph and Twitchell set out to create a new type of architecture for the Sarasota area of Florida. One that responded to the rapid economic growth of postwar Florida with modern homes that used regional elements and expression. They were original and represented the climate and the cultures of the area, something they felt was missing from early modernism. They were seeking to create meaningful modern homes that used construction technologies of the times to help advance comfort and livability and connected their clients back to the place.

[86] Domin and King, *Paul Rudolph The Florida Houses,* 30

> This combination of a wider view of modernist concerns with space, form, and technology, along with a focus on the specifics of the local culture and landscape, reflected each architect's individual skills and dispositions. Rudolph was the designer in the partnership and had close ties to advanced thinking in American modernism. Twitchell contributed a substantial portion of the locally and climatically inspired conceptual underpinnings of the work. He developed the construction technology, found and worked the clients, dealt with the overall course of the design work, provided the land in some cases, and built the houses.
>
> The location of this work was the small, yet ambitious, resort town of Sarasota, Florida, particularly its outlying islands, where the romantic idea of constructing beautiful little pavilions in the untamed subtropical wilderness contributed to their charm. Twitchell and Rudolph's clients were generally people of means from the north who desired second residences away from their settles, conventional lives (and cold winters), and who wished for a sense of exoticism and adventure in their seasonal homes. These houses, simple in program and set in the rich, sensual Florida landscape, gave the architects a nearly perfect opportunity for exploring ideas of modern expression, and as Rudolph claimed, there was "a certain freedom there that was exquisite." Though intimate in scale and often disarmingly simple in appearance, the houses possess an intense character, infused with meaning. In this sense they represent an intellectual and intuitive distillation process, in which the architects sought to resolve into clear architectural form interest in modern technology and spatial concepts, indigenous materials, and the relationship of the building to the landscape.[87]

In 1947, Twitchell made Rudolph an associate of the firm before he left on his fellowship in Europe that he received from Harvard. When he returned, Twitchell granted Rudolph a full partnership in the firm, renaming the firm, Twitchell & Rudolph, Architects. Rudolph was the primary designer for the firm and did all of the drawings. Twitchell on the other hand handled clients and construction. However that isn't to say that he didn't have profound influence on the firm's work. Rudolph's main priority was the idea and the concept of the buildings being produced. To him, an academic and an experimenter in architecture, it was the new idea that was the priority.

> In contrast Twitchell's priority was the constructed building, and his interest was in the physical reality of material, joinery, and detail. The houses of the partnership possess a strong material presence with their varnished cypress and rich colors, elements that are not often seen in Rudolph's independent practice, as he typically painted wood and emphasized line and mass over material. His later Florida buildings were usually articulated in white and shades of gray so that they tended to photograph, in black and white, more attractively and with more crispness and airiness that the partnership buildings with their deep colors. As Twitchell was more interested in the direct phenomenological

[87] Domin and King, *Paul Rudolph The Florida Houses,* 24

experience of the architecture rather than its image or representation, materiality and craft were emphasized during the partnership.[88]

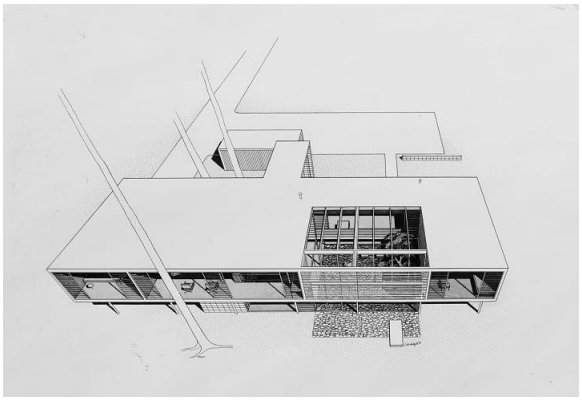

Fig. 43. Paul Rudolph, *Leavengood Residence, Bird's eye view perspective*. 1950, St. Petersburg, Florida.

Fig. 44. Twitchell with Rudolph, *Leavengood House*. 1950-51, Saint Petersburg, Florida.

Illustrated in the photos above shows how Rudolph's ideas and concepts about architecture where his main focus illustrated in his drawings (Fig. 43). To him, it was about the clarity of the idea. His drawings were made primarily for publications of the time and were often published before the building was even built. In the photo of the actual built building, however (Fig. 44), you can see where Twitchell's understanding of material and construction softened the architecture and gave the rectilinear form a more approachable character than Rudolph's drawing.

Twitchell and Rudolph would create many of the Florida Modern masterpieces together, but like several other points in Rudolph's career, there came a time when Rudolph had learned all he could. In 1952, after gaining local and national notoriety for their residences, Rudolph severed ties with Twitchell and started his own private practice. Through intention, there are clearly two distinct schools of thought behind the houses produced in these two periods. With Twitchell, Rudolph's designs were not only climatically appropriate to their site, but also materially and culturally as well. Twitchell had a softer understanding of architecture in Florida, one more attuned to a more natural lifestyle. Rudolph was primarily only focused on the idea and its clarity in representation in publications. Where the work of Twitchell and Rudolph used cypress and deep colors, the work of the independent practice of Rudolph was in monotone colors, using stark contrast and bright white to stand out from the environment, rather be of the environment. Rudolph continued designing residences in Florida while his national and international fame grew. In 1958, Rudolph reached a full tenure at Yale University as a professor and would travel the East Coast frequently to other universities as a guest critic. His work in Florida maintained however, as it still allowed him the flexibility and freedom to test out his new ideas that he learned on his travels. His later residences in Florida would be vastly different than those small little experimental houses he started with some two decades earlier. In comparing two houses by Rudolph in these two different periods, one can see his clear departure from the work with Twitchell. The Walker Residence (Fig. 45), one of the last houses done during the partnership, there is a clear simplicity to the design, and even though it is elevated above the ground it makes a connection to the site and its surroundings. In the Milam Residence (Fig. 46),

[88] Domin and King, *Paul Rudolph The Florida Houses,* 37

Rudolph departs from his modular structural systems from the past and creates an irregular sculptural brise solei out of white concrete. Though both are orthogonal models of Tropical Modernism, there are two different sensibilities to material, site, and context. One is an object to view the landscape, the other is an object to be viewed on the landscape.

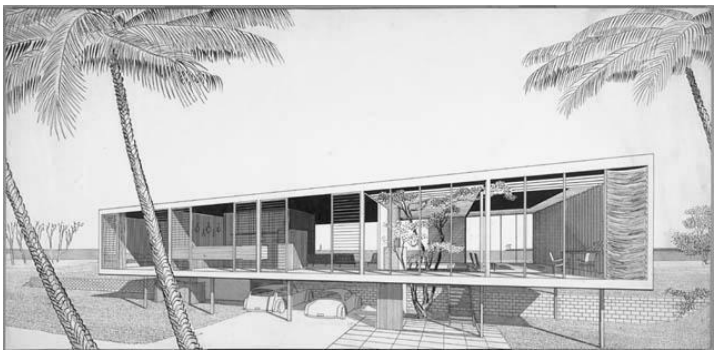

Fig. 45. Paul Rudolph, Walker Guest House. 1952, Sanibel Island, Florida.

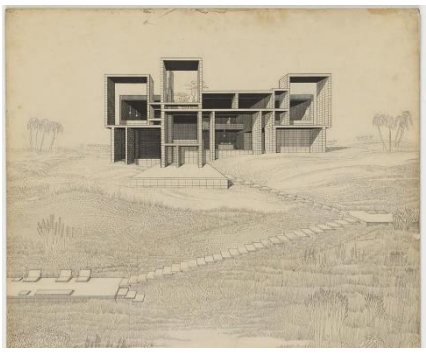

Fig. 46. Paul Rudolph, Milam Residence. 1960, Ponte Vedra Beach, Florida.

Comparison to Factors

Paul Rudolph made his own exploration into regionalism in architecture that related to Seckel's essay, *Hawaiian Residential Architecture*, on what the factors are that make up a regional language of design. Seckel's factors of isolation, material, economics, climate, setting, culture, and an environmental way of living that was specific to the tropics crosses over well into architecture of Florida, and particularly of Rudolph's work. Rudolph wrote essays and gave lectures about modernism's place in defining regional architecture. Along with other architects of his time, including Richard Neutra, he began examining the underpinnings of regional modernism in the south. In his own words, "Regional characteristics are a part of all good architecture and should be accepted without either resistance or overemphasis."[89] This can be seen in his work that is both universally modern and specifically Floridian at the same time. It was through accepting the factors put forth by Seckel for regional design that Rudolph was able to take the teachings of Gropius in modernism and make them suited to Florida. As Joseph King explains in *Paul Rudolph: The Florida Houses*,

> Through site design, scale, simplicity of architectural form, color, transparency, and materiality, each of the Twitchell and Rudolph projects made a case for a new, indigenous modern architecture intimately suited to the natural Sarasota environment.[90]

At a time in Florida, when housing markets demanded buildings of a certain classical foreign style, and there wasn't a specifically vernacular way of designing residences for the middle class, it is interesting to see how Rudolph and Twitchell adopted modernism in pursuit of a regional design language. By all means they were pioneers in the region amongst their peers of a few other Floridian architects that were trying something new, but trying to make it unique to the place. Christopher Domin explains as for Rudolph's inspiration,

[89] Domin and King, *Paul Rudolph The Florida Houses,* 138
[90] Domin and King, *Paul Rudolph The Florida Houses,* 43

> The initial concern for regional adaptation and the appropriate expression in architecture that is intricately related to its culture, climate, and landscape can be traced directly to his early interest in Frank Lloyd Wright's intimate weaving of building and site…[91] (139)

It was this initial spark from Wright's work that started the idea for a regional modern design sensibility in Rudolph's work. When he joined Twitchell he was able to explore those ideas familiar to Wright's designs.

> Many of the projects with Twitchell tended to integrate this influence by hugging the ground and emphasizing subtle relationships with the surrounding landscape, including garden courtyards that expanded the interior space of the house. Specific local building technologies and materials were combined with a set of imported ideas from his travels and experience at Harvard, which moved the work beyond provincial responses to local conditions and cultural trends.[92]

Material

Seckel explained in the essay *Hawaiian Residential Architecture,* that there needed to be a certain surplus of materials in order to help define a local architecture. In Hawai'i, there are many different indigenous materials (koa, monkey pod, bamboo, etc.), but there wasn't a surplus of any one material that could define a single construction type. This is also true of Florida, where they have many indigenous materials and construction methods, but not a surplus to define a regional characteristic. That being said, though, when a design does embrace the indigenous materials of its locale, it takes on a uniquely specific sense of place. Rudolph was one to experiment with new and innovative structural systems, usually of steel, but varied to bent plywood and reinforced concrete as well. But Twitchell was the one constructing the actual houses, and because of his sensibility to material and climate, found ingenious ways to use local building materials to reinforce Rudolph's concepts.

> The successful design and construction of the Twitchell and Rudolph houses were a direct result of the poetic and prosaic uses of material and technology. Twitchell had developed a system for using a type of lime block that was manufactured in Ocala, Florida, made from crushed indigenous limestone that gave the block a pleasing bluff color. The blocks were laid in a stack bond, one wythe thick, with steel reinforcing in periodic grout-filled vertical cells and in every third horizontal mortar joint. The walls were coated with clear silicone on the exterior to resist water intrusion. Internal webs of the blocks were left unmortared, and venting holes located in the bottom and top of the walls created essentially a cavity wall out of the thickness of masonry. In this way the ever-present coastal humidity and moisture could migrate back and forth, minimizing condensation and mildew problems. This system represents Twitchell's thorough understanding of the particularities of the local climate and is a direct interpretation of Wright's textile block technology, developed in his California houses in the 1920s and used at Florida Southern College. Underlying the complexity of making the block wall function properly was a simple idea: the

[91] Domin and King, *Paul Rudolph The Florida Houses,* 139
[92] Domin and King, *Paul Rudolph The Florida Houses,* 139

structure served also as the unornamented finished surface. The block walls had the same appearance regardless of location, so that the exterior and interior spaces were experiences as part of the same composition. In this way the exterior garden setting was as much a space of the house as the interior.

As a foil to the planar qualities of the Ocala blocks walls, Twitchell and Rudolph made expressive use of the linear character of lumbar and heavy timbers, especially heart-red cypress which they used for all exposed structure wood. The deep color and tight grain of this native wood possess an extraordinary depth and beauty and it is highly decay resistant, a necessary duality in the humid Florida environment. At that time, old growth cypress was harvested from the Florida swamps and was plentiful enough so that Twitchell could specify using only the heartwood that was dense, of even color, and virtually knot-free. In later years this lumber source was depleted, as the ancient trees were timbered nearly out of existence.[93]

Fig. 47. Twitchell with Rudolph, *Denman Residence, interior*. 1946-47, Image: 1950-51, Siesta Key, Florida.

Fig. 48. Twitchell with Rudolph, *Denman Residence, exterior*. 1946-47, Image: 1950-51, Siesta Key, Florida.

In the Denman Residence (Fig. 48), Rudolph designed the inverted truss roof made from Florida cypress and the walls are of the Ocala lime blocks. This early collaboration between Twitchell and Rudolph creates a pavilion like building that is modern and integrated into its surroundings. The material choices make it specific to Florida – the design makes it specific to the tropics.

Climate + Setting

One of the purist examples of Rudolph and Twitchell's sensibility to climate and setting can be seen in the Healy Guest House of 1950. Talked about early in this essay (Fig. 41-42), the Healy Guest House, or Cocoon House was an experiment on the architect's part in innovative structural systems. As seen in the interior photograph (Fig. 50), the roof was supported by metal straps, which hung in a catenary curve and delivered their load down to supporting columns and the tension out to steel beams protruding from the floor deck. What this simple and innovative structural system did was free all four facades of the rectangular house to different levels of opacity and porosity. The two walls on either side of that run parallel with the water's edge face east and west. They receive both the morning and afternoon sun, but also face perpendicular to the cool breezes coming over the water onto land. To both shade from the sun, and allow for

[93] Domin and King, *Paul Rudolph The Florida Houses,* 47

the wind to ventilate through the building, these two facades are made completely out of screen wooden louvers from floor to ceiling. This east-west direction is also the shorter direction, insuring the movement of air from one side to the other (Fig. 49). On the north and south sides, an all glass floor-to-ceiling window creates the barrier between inside and out. With small portions of jalousie and operable windows inserted into the all glass façade, Rudolph insures that further cross ventilation can be acquired. The house also sits above the ground – this not only creates a dramatic cantilever over the water's edge, but also allows air to pass below the house to help cool it. To prevent solar heat gain from the harsh tropical sun in Florida, the house's catenary roof is covered in mothball material called "Cocoon" – hence the house's nickname. The mothball material was typically used on boats during the war, but it not only had water resistant properties, could form to the shape of the roof, but also had great insulating properties as well. All of these attributes make this house work well in its specific climate. As Christopher Domin explains, this gives the Healy Guest House a regionalist sensibility,

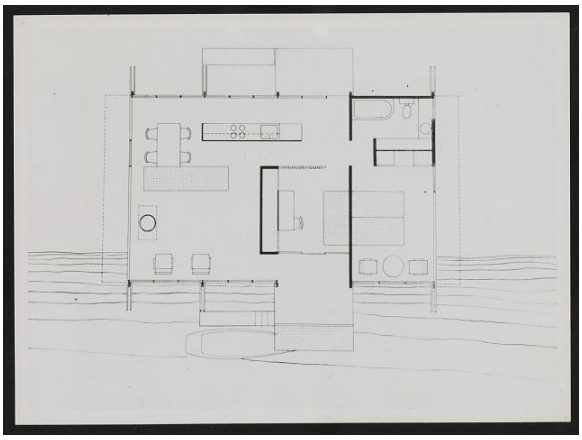

Fig. 49. Paul Rudolph, *Healy Guest House Plan*. 1950, Siesta Key, Florida.

Fig. 50. Twitchell with Rudolph, *Cocoon House*. 1950, Image: 1950-51, Siesta Key, Florida.

> Another conflict revolves around the difficulty in reconciling an appropriate response to a specific geographic location with the notion that good design can or should transcend accidents of place and time. This building is clearly designed for this site and climate and no other. Rudolph was very conscious of his Southern heritage and often remarked on what he felt was a special affinity between modernist architecture and warm climate. In the case of the Healy Guest House, the visibly raised floor level, perhaps recalling those seen on Southern sharecroppers' cottages, the attention to cross ventilation, the louvers designed to let in air, but block the sun, could all be called regionalist.[94]

Culture + Environmental Living

In terms of cultural influences in Rudolph's architecture, it can be analyzed that there are two points of reference – the contemporary culture of living in Florida, and the vernacular or indigenous. In terms of contemporary culture, this is simply the lifestyle of living, or as Seckel calls it in *Hawaiian Residential Architecture* – "environmental living."

[94] Domin and King, *Paul Rudolph The Florida Houses,* 19

Fig. 51. Twitchell with Rudolph, *Revere Quality House*. 1948-49, Siesta Key, Florida.

Fig. 52. Twitchell with Rudolph, *Revere Quality House*. 1948-49, Siesta Key, Florida.

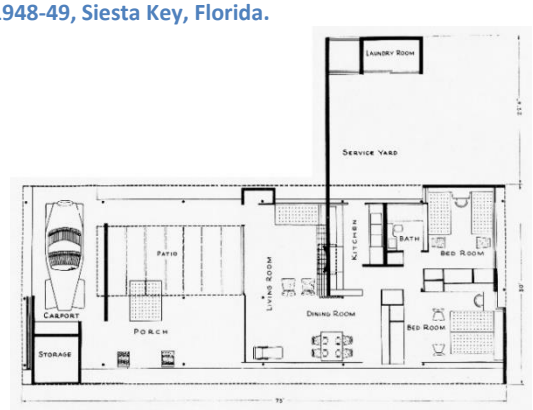

Fig. 53. Paul Rudolph, *Revere Quality House, Floor Plan*. 1948, Siesta Key, Florida.

Fig. 54. Twitchell with Rudolph, *Revere Quality House*. 1948-49, Siesta Key, Florida.

In these images from the Revere Quality House designed in 1948 by Rudolph and Twitchell, you can clearly see examples of the contemporary culture and lifestyle of environmental living. "The interior living space is located at the same elevation as the surrounding landscape, providing an immediate connection to the outdoors."[95] Enclosed in the center of the house is the patio area – an indoor courtyard with a grass lawn and covered above with a shading device (Fig. 51). What is unique about this house in its sensibility to environmental living is not only the seamless transition of indoors and out seen in both images, but the furnishings and programing of these indoor-outdoor spaces (Fig. 52). Seen on the floor of the patio picture (Fig. 51), is a daybed. This daybed is on its own slab cut into the grass lawn – as to not sit on the dirt – and is meant for interior sun tanning or lounging. Rather than typical interior couches or sofas, or even exterior chase lounges, Rudolph designed this curious piece of built-in furniture to take advantage of the screened-in outdoor space. It is partially covered from the sun and rain, completely protected from insects, but primarily left open to the elements. A design like this would not work anywhere else other than in the tropics.

In terms of the vernacular or indigenous cultural references in the architecture of Rudolph, you can see that the primitive hut was an inspiration for him in creating minimal tropical architecture. The primitive hut met all the comfort needs of its inhabitants and builders in terms

[95] Domin and King, *Paul Rudolph The Florida Houses,* 50

of climate and refuge, for Rudolph, it was a fascination with reinventing this archaic form. As explained in the book, *Paul Rudolph: The Florida Houses*,

> Rudolph often employed multiple strategies in response to the various needs of the client, program, site, or some specific outside stimulus. Considering the pristine coastal sites and very minimal programmatic needs of his clients, the metaphor of an archetypal primitive hut comes to mind, combined with explicit references to nomadic Arab tents. An interest in the foundations of early new-classical theory as well as in the archaic foundation of architecture found in the primal hut was further developed in Rudolph's research into the architecture of the Pacific Islands. This anthropological base of reference was certainly encouraged by a series of exhibitions staged at the Museum of Modern Art, beginning in 1949 with *Arts of the South Seas* by the curator Rene d'Harnoncourt during Rudolph's Naval service at the Brooklyn shipyards. Situated in a broader context, this predilection can be seen as a continuation of the formal interest in primitive art displayed in the work of early cubist painters and, later, in the work of the surrealists, who were well represented in the New York art scene at the time.
>
> The classically inspired primitive hut was never more evident in Rudolph's work than in his Walker Guest House (Fig. 55-56) of 1952-53. This was his most clearly conceptualized and rigorously geometric project to be constructed in Florida. The structural purity of the frame set this project off against the irregular sandy dune in which it is located, similar to an abstracted "spider in the sand." A series of operable "stressed skin" panels set with the module established by the frame, provide an ever-evolving spatial and climatically diverse dimension to the project. Two out of three panels on each elevation are hinged and made operable by marine hardware, rope, and a counterweight. A series of exterior cross bracing is installed to stiffen the minimal wood framing members, allowing ultimate transparency when the panels are fully raised.[96]

Fig. 55. Paul Rudolph, *Walker Guest House, pivoting wall panels raised*. 1952-53, Sanibel Island, Florida.

Fig. 56. Paul Rudolph, *Walker Guest House, pivoting wall panels lowred*. 1952-53, Sanibel Island, Florida.

[96] Domin and King, *Paul Rudolph The Florida Houses,* 133

The Walker Guest House (Fig. 55-56) was an open pavilion-like house that made its connections to the primitive hut through its minimal use of structure and space defining elements to adapt and open to the environment. Comprised mainly of nothing other than an elevated floor platform and a roof, it is an abstracted vision of the hut. During Rudolph's years growing his independent practice, the primitive hut and vernacular architecture of the tropics was a reoccurring theme. He wasn't seeking to recreate the vernacular, but in a type of academic or architectural study, recreate lessons learned from the primitive. As Rudolph wrote in the issue of *L'Architecutre d'aujourd'hui* that Rudolph edited in 1949 on the subject of Gropius in America, he talks about traditional references in modern architecture,

> We have today sufficiently clarified our minds to know that respect for tradition does not mean complement toleration of elements which have been a matter of fortuitous chance or simple imitation of Bygone esthetic forms. We have become aware that tradition in design has always meant the preservation of essential characteristics which have resulted from eternal habits of the people.[97]

Instead, he was interested in the architectural solutions of vernacular architecture, and allowed them to influence his design. In an article Rudolph wrote for *Perspecta 4* in 1957, he explains,

> I would suggest that you pay close attention to what we regard as untutored people and how they approach their problems, how they approached them in the past, and how they still approach them. Of course, I mean vernacular architecture. I think quite often people naturally do things when left to their devices, do things very well, and solve an awful lot of problems that architects tend to forget.[98]

This reference to the past was something that modernism in a way stood against – but it wasn't contextual references that many architects saw where problem, it was the un-contextual references that modernism was striving to get rid of. As King explains,

> For Rudolph, and many others of his generation, defining and utilizing the essential characteristics of a region became an inherently important ingredient in problematizing the inherited framework of modern domesticity as it was understood in the 1950s. Regionalism became the vehicle for inserting specific notions of place and cultural context into the vocabulary of contemporary architecture. It also allowed this generation to look deeply into its own history and beyond the now iconic textbook examples of European modernism."[99]

Comparison to Modernism

Paul Rudolph's career would be sprinkled with other modernist architects of his time. These encounters and lessons would come across in his work in different forms and studies. In his earlier career, while he was still producing single family homes in the Florida region, his work could be analyzed as the structural clarity of his mentor Gropius, and the regional influence of

[97] Domin and King, *Paul Rudolph The Florida Houses,* 140
[98] Domin and King, *Paul Rudolph The Florida Houses,* 140
[99] Domin and King, *Paul Rudolph The Florida Houses,* 140

Frank Lloyd Wright. But as Rudolph was experimenting with his houses in Florida, other rising architects of his generation were doing similar experiments in other regions of the tropics. One comparison is between Rudolph and the houses being built in the Case Study House program in California. The use of steel and innovative structural systems made them very similar, but it was also this new venture into the connection with nature that also made them so alike. The integration of regional traditions in modern architecture was seen across the board in many regions of the US.

Fig. 41. Twitchell with Rudolph, *Cocoon House*. 1950, Image: 1950-51, Siesta Key, Florida.

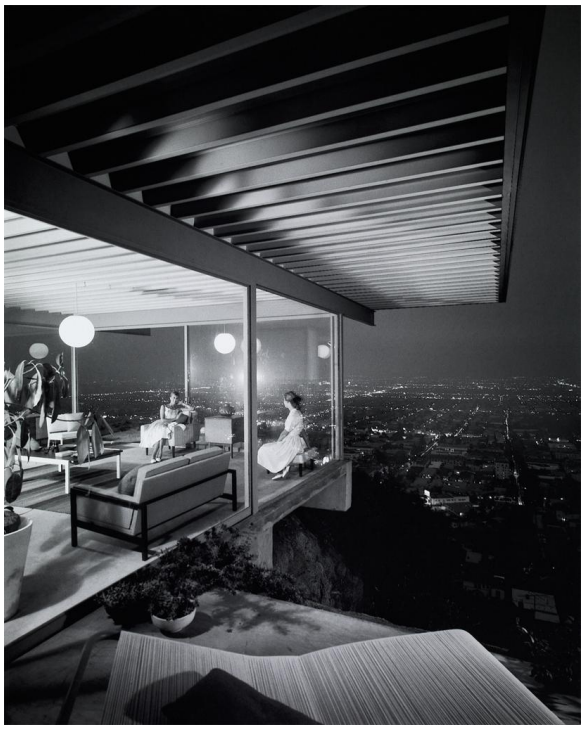

Fig. 57. Pierre Koenig, Case Study House No. 22. 1960, Los Angeles, California.

This consensus is especially noticeable in the work of designers in the warmer parts of the United States, where a kind of Sunbelt residential modernism reigned in the late 1940s and 1950s. From the hot, moist beaches of Florida to the hot, fry deserts of the American Southwest and Southern California, architects experimented with simple interior volumes of space enclosed by walls and screen of native materials, sheltered from the sun by overhanging roofs and opened by enormous plate glass windows connecting outdoors and indoors. The early houses of Rudolph are remarkably similar in many ways to several of the earliest Case Study houses in Southern California , for example those designed by Charles Eames, Eero Saarinen, and Ralph Rapson between 1945 and 1950. I could have started an essay similar to this one on the work of Southern California architects with the famous photograph by Julius Shulman of the Case Study House No. 22, designed by Pierre Koenig in 1959 (Fig. 57), in which two women sitting in the living room appear to be suspended over the edge of the hill with Hollywood and the entire Los Angeles basin forming a backdrop. Here again is that intimate relationship between indoors and outdoors, dramatically enhanced by the lens of the camera. Here is also that tension between the

> building as timeless work of architecture and as a period piece, the tension between the building as a simple piece of equipment, a universal space that could be built anywhere, and a design intended for only one spot in the world, a unique and unreproducible piece of ground and sky.[100]

Rudolph and the Case Study architects used steel and prefabricated structures in their designs, capitalizing on the new industrial building materials of their time. This construction method could have made their homes universal or contextual, but it was how these simple geometric houses connected with the environment that made them unique to their locale. Tropical Modernism by these architects is about innovation and context – one cannot alienate their architecture from the present while looking into the future.

[100] Domin and King, *Paul Rudolph The Florida Houses,* 18

California

Los Angeles was one of the birth places of mainstream modernism as much as its European counterparts. When Austrian architects like Schindler and Neutra settled in Los Angeles, they "were completing their first great works – the 1922 Kings Road House and the 1929 Lovell Health House, respectively – the Museum of Modern Art's famous *International Style* show, which first introduced modernism to mainstream America, was still several years away. In France, Le Corbusier's earliest groundbreaking houses – the Villa Garches and Villa Savoye – weren't completed until 1927 and 1929."[101] Los Angeles, California was at the cutting edge of the modern movement. But as modernism in Europe grew to follow theories and philosophies about minimalism, modernism in California grew to respond to climate and embrace new construction methods. But the context of the two birth places of modernism couldn't be more different. Europe was rich in history and culture – countries like France and Germany had old ancient cities from which modernism grew out of in juxtaposition. The US, and California in particular, was new – here modernism was the vehicle of the new age and a fresh start. Los Angeles didn't have the rich culture of, say, Paris or Rome. Los Angeles was a city built around the entertainment business in the 1920s, and had a reputation reflecting its shallow past. It has grown greatly since its birth place into a complex and sophisticated metropolitan with a wealth of modern residential architecture. As the Los Angeles architecture critic Nicolai Ouroussoff wrote about Los Angeles modernist beginning and path,

> … A majority of Americans found it hard to mention culture and Los Angeles in the same sentence without a smirk. Crafted by shady real estate promoters, the city's early image as the Land of Sunshine seemed to barley mask a seedier underbelly. And the city's cultural aspirations often seemed permanently tainted by its apparent intoxication with pop spectacles, celebrity crackups, and bronzed, pumped-up bodies. Those days are finally over. No educated person today can deny that Los Angles is fertile cultural territory. The city's wealth of modern residential architecture is unmatched anywhere in the world. [102]

Many architects migrated to Los Angeles from other parts of the world and the US. The great Californian architects like Richard Neutra and Eero Saarinen migrated here from Europe to this land of prosperity and opportunity.

> To all these architects, Los Angeles was no cultural wasteland. It was fertile ground for experimentation. Its informality, cheap land, gorgeous climate, lack of an identifiable center, and freedom from the often confining traditions of the East Coast allowed for an unheard of degree of individual expression, provided you had a bit of money or could find the right client.[103]

This same mentality has continued throughout time and Los Angeles as a city has continued to grow. As Ouroussoff continues,

> … Over the past decade it has been joined by a wave of new civic monuments, from the billion-dollar Getty Center to Frank Gehry's Walt Disney Concert Hall,

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[101] Tim Street-Porter, *L.A. Modern* (New York: Rizzoli International Publications, Inc., 2008), 12.
[102] Street-Porter, *L.A. Modern,* 8
[103] Street-Porter, *L.A. Modern,* 11

> Morphosis's Caltrans Headquarters, and Renzo Piano's newly expanded Los Angeles County Museum of Art.
>
> This cultural flourishing has captured the popular imagination, with sometimes mixed consequences. When I was hired as the architecture critic for the *Los Angeles Times* in the mid-1990s, most of the great modernist houses built in the 1930s, 1940s, and 1950s were still in disrepair. Some of them were still occupied by their original owners, who often could barely afford the upkeep. At the same time, their weathered facades and cluttered rooms imbued them with a run-down, Bohemian charm. Those of us who were privileged enough to be invited inside knew we were being initiated into a fragile underground network, bound together by a love of that history.
>
> A decade later, these houses have become valuable commodities. Many of the most famous of them have been snatched up and meticulously restored by Hollywood producers, money managers, or fashion moguls. They are rented out as film locations and for fashion shoots and they look the part: well-scrubbed, art-designed interiors embellished with blue-chip artworks.[104]

There was a time too when Le Corbusier's Villa Savoye was in ruins as well and it took a major restoration effort to return it to its former glory. As in Europe, so was in California and the US – but there was a different feeling behind the modernism in California that kept them in nostalgic views. Los Angles modernism was another branch of the Tropical Modernist movement where the connection to nature, climate and the context was paramount. Influences of Japanese architecture and relationships to the environment were reinterpreted with modern materials. This connection to nature kept a certain appeal to people that made these homes sanctuaries that nurtured comfortable environments. These nests among the trees were different than their cousins to the East or in Europe. This connection with the environment, and the ample opportunities fostered many bench marks of the modernist movement – including the Case Study House program.

The Case Study House programs was the creation of John Entenza, whose aim was to foster young talent into create mass producible houses for the new suburbia of Los Angles. His dream couldn't keep up with the demand for suburban housing and the modern movement fell behind. But nonetheless, Entenza's Case Study House program and publications helped launch the careers of new architectural talents. Including Gregory Ain, Harwell Harris, Charles and Ray Eames, Pierre Koenig, Craig Ellwood, Thornton Abell, Quincy Jones, and John Lautner.[105]

> And it produced a stunning array of outright masterpieces. The programs' values were best reflected in projects like the Eames House, whose delicate steel frame rested in a meadow framed by eucalyptus trees, like an apparition conjured out of thin air (Fig. 59). Or Pierre Koenig's Case Study House No. 22, with its sleek concrete slab projecting out from the edge of Santa Monica hills above the city (Fig. 58). Seen at night, people strolling through the famous living room seem to be suspended weightlessly above the city with its twinkling lights stretching out to infinity below them. It is a perfect image of the fragile bond between individual and collective, the nuclear family and the social mechanisms that

[104] Street-Porter, *L.A. Modern,* 8
[105] Street-Porter, *L.A. Modern,* 11-15

> envelope them. And it begins to hint at the subtle tensions that lay hidden just beneath the surface of this new American dream. Like other houses of its time, it offers us a uniquely American, deeply personal vision of the world, rooted in individual freedoms.[106]

This section on California based precedents will focus on Richard Neutra, although there are other architects in the case-study house program that are of note for Tropical Modernism - Pierre Koenig, and Charles and Ray Eames for example. Their work benchmarks Los Angeles modernism, California modernism, and became continuing influences for Tropical Modernism around the globe. Neutra had a Japanese sensibility to nature in his homes, Koenig embraced the new technologies of his time in structure and steel, and the Eames's brought culture and life to a sterile modernist trajectory. Koenig launched his architecture career at an early age, building his first steel home while in his second year of architecture school. His clean lines, open plans, and wall-less houses fit well into the lifestyle of California at the time and his work is synonymous with modern residential architecture (Fig. 58). Charles and Ray Eames are known for their furniture line through Herman Millar. The pair are part artists, part inventors, and part designers. Their furniture influenced a generation of furniture designers, but their residence that they built for themselves, represents their overall design philosophy of democratic design – design for all (Fig. 59). Their work is built from affordable materials and designed to be mass produced so that the rising middle class of the time could afford good design. Their house is of the same dogma, lightweight exposed steel structure enclosed in modular windows, furnished in their furniture, and brought to life with the color and artwork of the couple.

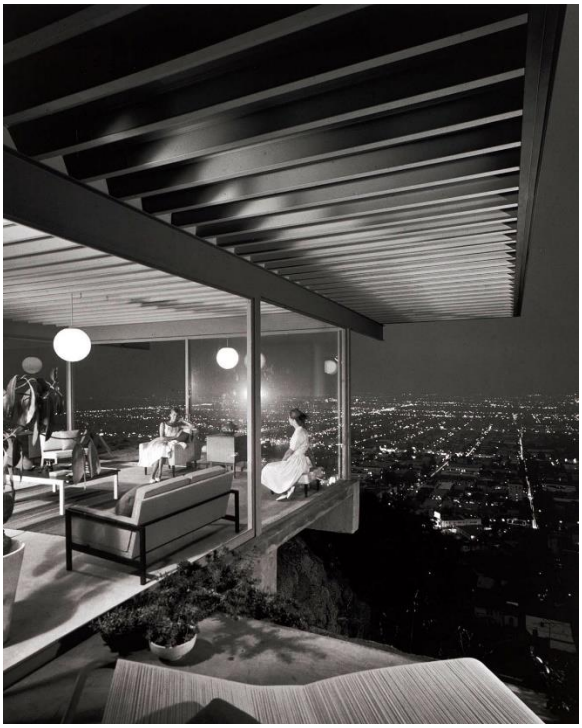

Fig. 58. Pierre Koenig, Case Study House No. 22. 1960, Los Angeles, California.

Fig. 59. Charles and Ray Eames, *Eames House*. 1949, Los Angeles, California.

[106] Street-Porter, *L.A. Modern,* 11-15

Richard Neutra (1892–1970)

Overview

Fig. 60. Richard Neutra, *Richard Joseph Neutra and Julius Shulman portrait, Tremaine House*. 1950, Montecito, California.

It is often a question if someone is the product of their environment, or if they determine their own destiny – Richard Neutra (Fig. 60) is an interesting case in that study. He seems to be a bit of both – both determined to set his own path and chose his destiny over a lifetime of engagement with architecture – and a product of his environment, growing and changing in reflection to events that happened of the course of his life.

Born in Vienna in 1892, he was schooled by Adolf Loos and immigrated to the United States, not to escape prosecution as many immigrant architects of his time did, but instead was invigorated with America's optimism and architecture. He was a world traveler and spent time in Japan, throughout Asia, as well as many different countries in Europe. He wrote, he lectured, and he worked and was associated with many of the other great architects of his time, like Frank Lloyd Wright, Adolf Loos, Eric Mendelsohn and Rudolph Schindler. Like Lloyd Wright, before him, had found Wisconsin and Arizona to be his sanctuaries, Neutra found California to be his. Neutra, though he is known globally for his International Styled residences and structures, is best known for his small influential residences that came to shape California Modernism.

Why he is an interesting study in passive or active destiny is because of his driven and motivated thoughts and conscious decisions not only in his designs, but also in his life. He made decisions in his architecture that were deliberately inspired by what he saw on his travels to Japan – they weren't subconscious manifestations or purely studies. He also didn't let things happen to him in his life, he made things happen. It was his decision to move to America and practice architecture in 1923. Neutra had a long lasting relationship with classmate Rudolph Schindler where they met at the Vienna Technical University in 1911. They shared interests in the work of Adolf Loos and Frank Lloyd Wright, and both eventually immigrated to Los Angeles. Though they settled in LA at different times, they maintained their friendship and became brief professional partners over the years.[107]

Before partnering with Schindler in Los Angeles, Neutra moved from New York, to Chicago, then to Spring Green, Wisconsin where he worked for Frank Lloyd Wright for three months. Displeased by Wright's obsession with masonry and his use of ornament, Neutra and his wife, Dione, moved to the west coast where they arrived on the doorstep of Schindler in LA. There they stayed for five years, working together on projects and competitions. One competition was for the League of Nations (Fig. 61). During this time Neutra worked on a book called *Wie baut Amerika,* published in 1927. The book advocated for the use of new construction technologies found in America, like steel, and its use in projects he worked on for Irving Gill, Schindler, Wright, and himself. Two years later he created the Lovell Health House, to much acclaim (Fig. 62). Then several years later in 1932, he was invited to participate in the "Modern Architecture" exhibit at the Museum of Modern Art, New York. Neutra was the only West Coast architect to be chosen.[108]

The book, *Wie baut Amerika,* that Neutra wrote gave him his first international fame. From that he was able to do much of his lecturing around the world and that experience shaped his later work. The Lovell Health House (Fig. 62) was, and still is, regarded as the epitome of the International Style – but many say that Neutra's experiences in Japan can start to be understood as inspiration in this early masterpiece, which are later explicitly illustrated in his later houses.

Fig. 61. Richard Neutra with Rudolph Schindler, *League of Nations Entry*. 1926, Geneva.

Fig. 62. Richard Neutra, Lovell Health House. 1928, Los Angles, California.

[107] Barbara Lamprecht, *Richard Neutra: Survial Through Design* (Koln: Taschen, 2006), 8.
[108] Lamprecht, *Richard Neutra: Survial Through Design,* 13

But on the other side of the spectrum of destiny, there were many things that happened to Neutra that helped determine who he was as a designer. Health and climate was one of them.

> Like many Modernists who emerged from the 19th century, Neutra understood only too well the value of light and moving air and its impact on health. It was known that conquering tuberculosis owed more to 19th century social reform movements than to the 1882 discovery of the tubercle bacillus or to treatment. Neutra's grandparents died in the mid-1850s from a typhoid epidemic; his father, Samuel, died in 1920 from the influenza then raging across Europe. Neutra himself almost died from malaria and apparent tuberculosis during his World War I military stint. It is no wonder, perhaps, that his personal history amplified his evolving concept of "biorealism," to the point that Neutra conceived good design as medicine for physical well-being."[109]

Through his experiences over his lifetime, his houses became refined as integrating both culture and archetypes of Tropical Modernism, heavily inspired by Japanese architecture, and climate, a priority and mission brought on by his own experiences of health issues brought on and cured by environmental design. Neutra worked until the end of his life, passing on much of his legacy to his son, Dion, in California. His small, compact, but well sited houses are once again admired and reveled for the sensibility to these two factors of design (culture and climate). His once intensive studies of user lifestyles in his houses and their architectural responses make the houses cleverly designed, but it's also his balancing consideration to climate, context, and material that make them last well beyond the initial owner and into present day.

Comparison to Factors

Richard Neutra's houses evolved over the course of his career, once he found his stride however in the 1930s, his houses moved away from the stark white lines and planes of the International Style and came to define California Modernism. The considerations that came to influence Neutra's work were factors that go along with Henry Seckel's factors for regional design – factors like material, climate, setting, culture, and environmental living. Because of Neutra's considerations of these factors, it did start to define a regional architecture for California.

Material

Fig. 63. Richard Neutra, *Lovell House*. 1929, Los Angeles, California.

Fig. 64. Richard Neutra, Beard House. 1934-1935, Image: 2009, Altadena, California.

[109] Lamprecht, *Richard Neutra: Survial Through Design,* 55

Neutra's first masterpiece, the Lovell Health House of 1929 (Fig. 62-63) is characterized by its all white materiality and open windows. This dematerialization is associated with the International Style, and carried through the first few houses afterward. The houses were all white stucco, focusing on their geometry, planes, lines and the *De Stijl* like compositions. This continued in his later homes like the Beard House of 1934-35 (Fig. 64) where he experimented with steel components that made up both cladding and structure. Neutra was focusing on theories and ideas disused in the international scene of modernism, but these freedoms weren't grounded in a single place, but instead grounded in the freedoms of architectural experimentation. This freedom was one of the reasons why he moved to California in the first place, but as soon as he was asked to consider not the freedoms of design, but the responsibility of design, his work started to see a more interesting change and expression. As Drexler explains about this change in materiality, Neutra was making houses in the white stucco material over light steel construction,

> But shortly before the war one client who disliked stucco requested redwood siding. Neutra obliged, and the McIntosh house of 1939 (Fig. 65) marked a new willingness to move toward an indigenous "tradition," later called the Bay Region style. It is rather less conspicuous in Los Angles than around San Francisco but is not limited to Northern California, and the horizontal wood siding Neutra used in 1937 on the façade of a San Francisco townhouse had already shown that he could respond sympathetically to a context he found congenial. But the redwood board and batten Nesbitt house (Fig. 66), begun in 1942 just weeks before wartime restrictions curtailed building, was the decisive integration of Neutra's personal idiosyncrasies with a regional idiom. The Nesbitt house was and still is a beautiful and even poetic building, and was immediately recognized as such.[110]

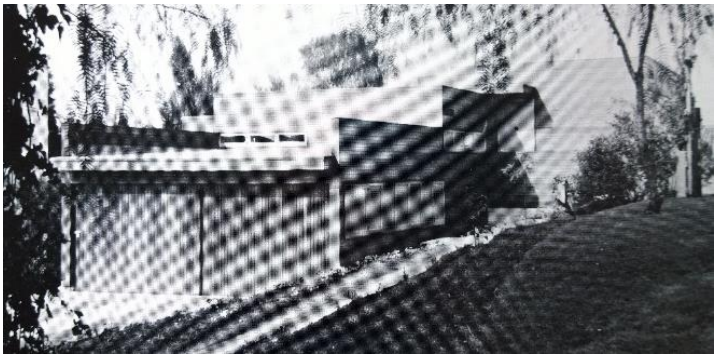

Fig. 65. Richard Neutra, McIntosh House. 1939, Los Angles, California.

Fig. 66. Richard Neutra, *Nesbitt House*. 1942, Los Angeles, California.

This change in materiality stirred this concept of regionalism in Neutra's architecture. His forms and expressions of space were still expressive, but their execution became more natural and less alienating with the rendered material. They started engaging more with their site and their location. Because of the scale and budget for the majority of Neutra's residences, he preferred a kit-of-parts approach to design, but his ensemble of parts changed material over time.

[110] Arthur Drexler and Thomas S. Hines, *The Architecture of Richard Neutra: From International Style to Califonia Modern* (New York: The Museum of Modern Art, 1982), 20-21.

> Beginning in the early 1930s, Neutra refined his formal idiom in a family of details over decades. Metal casement windows remained a stalwart element of Neutra's kit of parts, used for lavish homes or projects as modest as the haunting redwood-clad "Three Small Houses in an Orchard," Los Altos, 1935-39. For interior finishes Neutra preferred monolithic surfaces and hardware-free cabinetry for maintenance ease and because they read as clean planes. The rubbed, waxed Masonite of the 1930s gave way to birch, mahogany and Japanese ash plywood, painstakingly detailed so that wood grain matched even when planes changed.[111]

Climate

As explained earlier, Neutra understood the effect that the built environment had on people's health. Climatic concerns like air quality, ventilations, and natural light could considerable contribute to his client's wellbeing. Because he was working in the pre-air-conditioning age, he couldn't rely on mechanical assistance on insuring these aspects of climate. Over the evolution of his residences, he compiled several tricks and considerations for how to orientate and control factors like ventilation and sun light. In California, unlike other regions of the Tropical Modernism, there are cold winters, and an open air strategy with a connection to the elements isn't as appropriate here, so consideration of heating and insulating in the winter was also a factor. This conflicting connection and insulation factor from the elements wasn't always resolved in his houses.

> Generally concerned with proper orientation, not only to the contours of the particular site but to the rays of the sun, Neutra protected vulnerable exposures with cantilevered overhangs. Yet his love of glass rendered him insufficiently cognizant of the heat gain and heat loss occasioned by such expanses. He also failed to realize that a smaller window segment might better frame a landscape than would a wide expanse of undivided glass. Building in the pre-War period before the advent of air conditioning, Neutra was particularly sensitive to air circulation patterns. Both functionally and poetically he placed great reliance on the tactile and olfactory properties of "the breeze from the garden." Indeed, whatever the pros and the cons and the obvious differences between the two periods, the most important element of all his best architecture was its nature-related quality of profound serenity.[112]

The elements that Neutra used to achieve this "nature-related quality" that became a staple in his houses over the decades were two common elements – the large expansive glass and the window sill vent. The expansive, uninterrupted glass gave Neutra's home the panoramic connection to the scenery around them. With no screens covering them and no frames allowing them to be opened, they did allow for a visual connection, but not a physical one. The sill vents however, were Neutra's solution to this problem. Similar to elements in other topical modernists like Ossipoff in Hawai'i, Neutra created ingenious ways to hide these screened sections of walls below the windows to allow the continuous flow of prevailing winds through the house.

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[111] Lamprecht, *Richard Neutra: Survial Through Design,* 13

[112] Thomas S. Hines, *Richard Neutra and the Search for Modern Architecture* (New York: Oxford University Press, 1982), 254.

> The Hinds house has sheets of glass 12 feet long and 42 inches high without visible frames, making the interiors surprisingly open. Ventilation is through louvers at floor level."[113]

As seen in the Hinds house of 1951 (Fig. 67) the line of seen below the windows on the exterior façade not only add to the horizontality of the house, but are also screened louvers that allow air in under the desk in the bedroom.

Fig. 67. Richard Neutra, *Hinds (Jay) House*. 1951, Los Angeles, California.

Fig. 68. Richard Neutra, *Wilkins House*. 1949, South Pasadena, California.

In Neutra's Wilkins House of 1949 (Fig. 68), he uses a different way to hide the louvered screens from obscuring the planar composition of his houses.

> The detailing of the house included a little-seen but elegant ventilation strategy in the living room and master bedroom, with screened birch panels placed below a row of casement windows. Hinged from the top, they introduced air inside when curtains were drawn. It also allowed casements to be without screens, which Neutra avoided where possible because they compromised the outdoor view.[114]

> Neutra disliked window screens because they physically and aesthetically compromised the seamless – and necessary – experience he sought for the user, one that blended indoors and out. Here his clever but rarely employed ventilating screens on the living room's south wall, now restored, permit cross-breezes when open and is disguised as conventional wall paneling when closed.[115]

[113] Drexler and Hines, *The Architecture of Richard Neutra: From International Style to Califonia Modern,* 108

[114] Lamprecht, *Richard Neutra: Survial Through Design,* 71

[115] Lamprecht, *Richard Neutra: Survial Through Design,* 72

Setting

Neutra's houses were consistently well sited on their lots. He was able to turn dense housing conditions in an urban area seem suburban in quality because of shared site lines and an integration with the nature around them. He also tended to create small compact houses on rather spectacular lots, capitalizing on the natural aspects of the site – factors like view and vegetation. This is also the reason, however, why many Neutra houses are being torn down today – their small square footages don't reflect their high property value in the rising prices of land values in Los Angeles. But Neutra wasn't as concerned with the grandness of his residence sizes, instead giving lot area to view and space was important to him. This came from a philosophy that Neutra believed,

> Neutra accepted the hypothesis that the human genetic code evolved on the savannas of East Africa with its open plains interspersed with groups of trees. That hypothesis had dramatic consequences for his designs. Humans had to be able to orient themselves in their surroundings, for which they needed all their senses. The theory provided rationale for why people need physical contact with nature, even why they need to see the horizon. Embracing such a hypothesis was also one of the reasons Neutra went not just to America but specifically to warm, freedom-loving southern California.[116]

Culture

The major cultural influence to Neutra's work was brought upon by his trip to Japan in 1930. This voyage influenced him greatly not only in the elements that he chose to incorporate into his architecture in later years, but also in the way that Japanese architecture deals with nature, minimalism, and social class. In 1930, Richard Neutra was invited to give a lecture on his recently released book, *Wies Baut Amerika*, and recently completed Lovell Health House in Japan and East-Asia. He documented and wrote about this trip and reflected upon it frequently – its effect on him can be studied through the letters he wrote to family and colleagues as well as the articles he wrote for various periodicals.

> He recorded his impressions of Asian life and architecture in a series of articles for the Berlin journal *Die Form.* Despite his fascination with China and Indochina, he acknowledged with greater conviction his admiration for Japan. His *Die Form* articles on Japanese architecture stressed his love for the ancient, timeless, tea-house, vernacular, as expressed and heightened in such famous examples as the seventeenth-century Katsura detached palace in Kyoto. He also championed the modernist legacies of that tradition that had come forward to clasp hands with the modern movement in the West.[117]

Of these observations was Neutra's thoughts on Japanese traditional residences – their relationship with nature and the way that they dealt with different elements were modern in appearance, despite being century old practices. Many modernists were looking to traditional Japanese architecture for inspiration on how to handle different elements, but Neutra saw that what makes Japanese architecture so applicable to modernism wasn't just the aesthetic arrangement of elements, but the cultural implications of those elements. There was thought

[116] Lamprecht, *Richard Neutra: Survial Through Design,* 9
[117] Hines, *Richard Neutra and the Search for Modern Architecture,* 93-94

and effort behind the restraint architecture and deliberate connection to nature, but it was something universal to all demographics of people in Japan.

> The Japanese designers, new and old, Neutra later reflected, worked in an atmosphere "so unbelievably different from my own background, and yet so close to my feelings of treating space and nature or gaining emphasis often only by surrounding restraint." He observed with a combination of surprise and *déjà vu* "how the Japanese lightweight house fitted Japanese music and modes of living and privacy, how furnitureless small rooms corresponded to Japanese sociability, manners of eating and diet, as well as to those of dancing and watching the dance. The rich and the poor, the urban and wealthy and the peasant, all had the same standard of dimensions, from tatami floor mats, sliding door panels, to tansu, built-in drawer sets. Detailing and finishing were as simple and normalized as they were superbly neat. I had been striving for all that, and I was no longer alone."[118]

Fig. 69. Richard Neutra, *Lovell House*. 1929, Los Angeles, California.

Fig. 70. *Katsura Rikyu: Goten Building*. Kyoto.

In discussing Neutra's 1929 Lovell Health House (Fig. 69), Hines takes apart several elements and compares them to their Japanese equivalents. Though Neutra's trip to Japan wasn't until 1930, he was well aware of the architecture and its elements through other means and discussion. Hines discusses the parapet of the Lovell house and its aesthetic functions, as well as its functional characteristics,

> The parapet or spandrel has another use that is almost as important: its extension away from the building to define an outdoor area by means of an overhead frame. Wright characteristically attached his houses to the landscape by low, ground-hugging garden walls. In a sense Neutra lifted these up into the air, but his use of such wall elements to describe a space is perhaps more conditioned by interior design. The use of a narrow band of white plaster above wood paneling of course goes back to the Elizabethans, and was adapted by Wright as well as by the Europeans. (Mies's Riehl house dining room can stand for dozens of examples.) In Japanese architecture strip of plaster wall, called *kokabe*, above the sliding doors became a principle means, especially in the way

[118] Hines, *Richard Neutra and the Search for Modern Architecture,* 94

> it was related to the ceiling plane, of unifying a room whose elevations might all be different. In some Japanese usages these overhead bands might be of different heights, their intersections calling attention to a feature such as a corner alcove. Neutra turned this upside down, using such jogs for changing windowsill heights so that attention is directed toward the floor plane rather than the ceiling. But just below the ceiling he often retained a much narrower band of white plaster (its Japanese equivalent is called *arikabe*), apparently being more concerned to reinforce the perimeter of a room than to let the space flow out through the windows by way of an uninterrupted ceiling plane. And quite often he developed the lower wall as a dark, sometimes shiny, wood surface that also recalls Japanese precedent.[119]

Neutra's use of steel casement windows on the Lovell Health House also has a Japanese precedent. The close repetitive pattern and spacing of the nearly all glass façade (Fig. 69), takes on a likeness to the repetitive elements found on the Katsura Villa (Fig. 70). The casement windows were spaced as such to keep within the structural bay of the steel structure of the house, but the consistency in size and placement create a character of woven fabric. This relates to the more delicate tea house architecture of Japan, as opposed to the heavy temple architecture.

> Whatever analogies may be made with Japanese design, one difference is striking. For Neutra the module is a useful device for organizing the rhythm of the *wall*: it is not a true plan module like a tatami, because it only indirectly influences the proportions of rooms. Instead it leads to an undifferentiated perimeter rhythm made up of redundant structure. In later years Neutra began to use large sheets of fixed glass and finally eliminated his narrow window module – by then a Neutra trademark – in favor of structural elements more widely spaced and boldly defined.[120]

The Lovell House however reflects only the early influence of Japanese design on Neutra's architecture. As Neutra's own personal style switched from the beginning of his career to his later houses, so did his interpretation of Japanese architecture. In the Lovell house, he was inspired by the crisp white planes of Japanese architecture, later, it was the craftsmanship and use of humble, natural materials and relationship to nature that drove his architecture.

> Many of these qualities continued to point up the debts Neutra owed to Japanese esthetics and the continuing impact upon his development of the simple, timeless, abstract elegance of Japanese design. Whenever Neutra's work moved closest to perfection, it was the kind of perfection implicit in the haiku rather than in the classical English sonnet. In the 1920s, and particularly following his visit to Japan in 1930, he was most impressed by the white and gray palette of such classic structures as the main pavilion of Katsura Palace, Kyoto (late sixteenth century) and its modernist legacies in such works as Yamada's recently completed Electrical Testing Factory in Tokyo. In the 1950s

[119] Drexler and Hines, *The Architecture of Richard Neutra: From International Style to Califonia Modern,* 50
[120] Drexler and Hines, *The Architecture of Richard Neutra: From International Style to Califonia Modern,* 50-51

> and '60s however, the changing character and rationale of his work turned him increasingly to the darker more textured, and informal vernacular. How was it, he once asked his son Raymond, that with all its apparent similarity of elements, a city like Kyoto was never, never boring? By the imaginative manipulation of a few simple modules, he surmised, by ever deferring to the richness of nature, by caring for the landscape with love and attention and repairing it when necessary with skill and finesse, much of the subtlety and beauty of Kyoto could be achieved in a "modern" city designed by Neutra.[121]

Environmental Living

One of the key factors to Tropical Modernism is environmental living. The climate allows for a certain type of lifestyle and therefore a certain type of architecture. The architecture here can have a more integrated indoor-outdoor connection than it can in other colder parts of the world. Neutra's houses extended out into the environment and create prolonged transitions between covered and uncovered space.

> … If there is a "sacred spot" in a Neutra house, it is not the Wrightian hearth. It is the terrace separated from indoor space by a sliding glass wall, preferably a terrace with radiant heating, so that he relationship between indoors and out is charged with ambiguity. Calculating a building's square footage *should* be hard if boundaries cannot be defined. His attempt to knit the indoors and out initially entailed the use of tall windows with low window sills, providing some semblance of protective enclosure. Later floor-to-ceiling glass sometimes proved detrimental to "shelter." Caroline (Mrs. Henry) Singleton, co-owner of one of Neutra's most photographed houses (Fig. 71), recalled that she felt "too exposed" in the house.[122]

Fig. 71. Richard Neutra, *Singleton House*. 1959, Los Angeles, California.

Fig. 72. Richard Neutra, *Von Sternberg (Josef) House*. 1935, Los Angeles, California.

Neutra resolves this indoor-outdoor relationship in different ways over several of his projects. Whether it is through large expanses of glass that visually merge the two spaces into one, or by treating an outside space like an indoor one through walls and furnishings. Each ploy was used

[121] Hines, *Richard Neutra and the Search for Modern Architecture,* 255
[122] Lamprecht, *Richard Neutra: Survial Through Design,* 10

at different times and to different effects depending on site and client. For example, the Singleton House (Fig. 71) expands into its environment with its elements intersecting both spatially and in plain. Neutra's Von Sternberg house encloses an outdoor patio on all sides with a wall, literally making the outdoors an architectural volume (Fig. 72). This is the difference between an introverted relationship between in and out, and an extroverted relationship. According to Drexel and Hines, the Von Sternberg house is his only example of a completely enclosed patio where most of Neutra's architecture is extroverted. Spectacular views and garden areas usually draw the viewer's eyes outward from the house, but this walled space brings people in. It seemed that every non enclosed space on all six sides in a Neutra design was labeled as patio on the plans. Whether it was introverted or extroverted, these partially defined outdoor spaces where Neutra's guise to connect people with nature. He may have labeled them as patio to insure his client that these were modern houses and were anything but the Spanish Colonial houses typical of California.[123]

> This relationship between inside and outside is somehow problematic in Neutra's architecture. Glass is used abundantly and is almost always shielded by overhanging roofs. Rooms are clearly defined and the obvious attempts to merge indoors and outdoors are carefully limited. One moves easily from room to garden. The sense of physical well-being they produce is one of the most persuasive aspects of modern architecture in its California Style, as such living arrangements came to be called in popular magazines. Yet it is possible to sit in a Neutra living room and wish that one could get indoors. Whether there is too much sunlight is a subjective judgment, perhaps, and given the California climate and the usual dramatic view it might seem perverse not to open a house to the outside. "Survival Through Design" was the title Neutra gave his collection of essays on the relation of architecture to human physiology, and the necessity, as he had come to think, of designing for the full range of nonvisual pleasures. In practice this benevolent concern may not always have succeeded. And nature abuses its champions as well as its despoilers. "Here you can grow trees in a desk drawer," John Entenza used to tell visitors to Los Angeles, and the beautiful gardens Neutra designed have often grown to conceal his buildings.[124]

Comparison to Modernism

Richard Neutra was in contact with many different modernists over the course of his career, picking up or disagreeing with each one of their different styles and beliefs about architecture. It is first easiest to compare him to those that he had direct connection with, then to consider him against other Tropical Modernists and, more appropriately, other Californian modernists. His first connection to other modern architects was in school, working under Adolf Loos and his other European connections from his past.

> While Neutra appears not to have been influenced by Loos's style – an ethics-driven eradication of ornament in favor of stripped-down, space-packed masonry cubes – he did absorb the Loosian ideal of "lastingness," of casting off anything superficial, of the nobility in anonymity and rich but unadorned

[123] Drexler and Hines, *The Architecture of Richard Neutra: From International Style to Califonia Modern,* 55
[124] Drexler and Hines, *The Architecture of Richard Neutra: From International Style to Califonia Modern,* 55

materials. He was certainly influenced by Loos's feverish love for America. The Dutch De Stijl movement was a more formal source of inspiration. Neutra experienced firsthand its attention to mass and proportion, to composing in point, line and plane, in 1930, when he slept in Gerrit Rietveld's 1924 Schroder House in Utrecht, Holland (Fig. 74). Its controlled asymmetry and flexible layering of functions within the same space reasoned with the traditional Japanese architecture he had seen the same year.[125]

Fig. 73. Richard Neutra, *VDL Research House II*. 1964, Los Angeles, California.

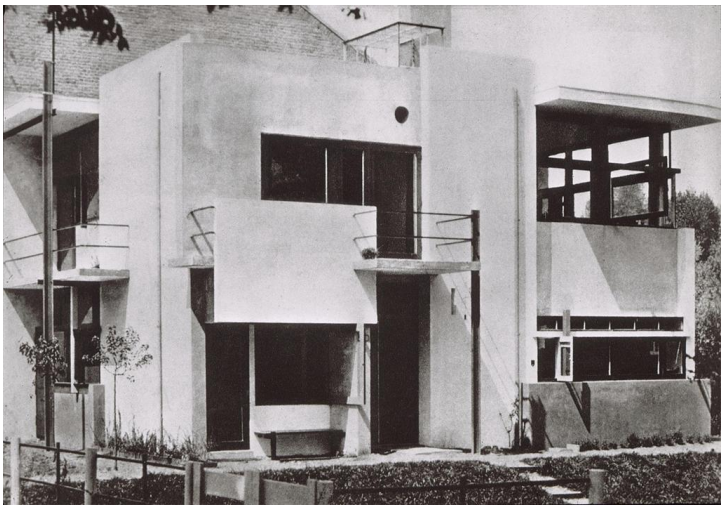

Fig. 74. Gerrit Rietveld, *Schroder House*. 1923-24, Utrecht, Netherlands.

Influences of the *De Stijl* architecture Neutra experienced could been seen in many of his houses, with their extending planes and lines that go past and through each other. In his second VDL Research House (Fig. 73) that Richard collaborated on with his son Dion Neutra, you can see how the front entrances of the VDL house and Rietveld's Schroder House (Fig. 74) are veiled from the elements by overhanding second floor balconies that are represented as white planes floating overhead. Vertical elements of structure and, in the case of Neutra, vertical louvers, also float away from the façade and main volume of the house. In the end, the two houses volumetrically are compositions of different orthogonal planes and lines that create spaces and moments of interest in their design.

[125] Lamprecht, *Richard Neutra: Survial Through Design,* 9

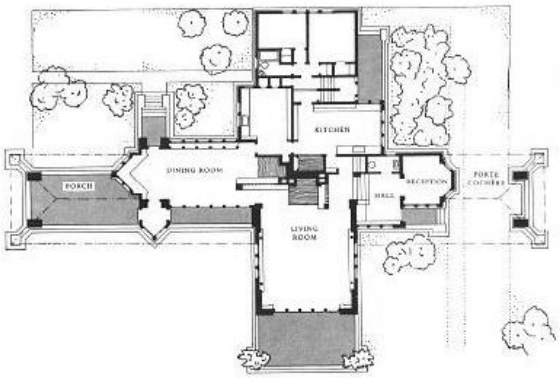

Fig. 75. Frank Lloyd Wright, *Willits Residence*. 1901.

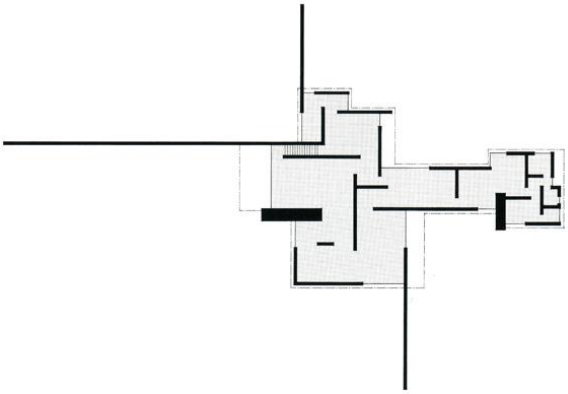

Fig. 76. Mies van der Rohe, *Project for a Brick Villa*. 1923.

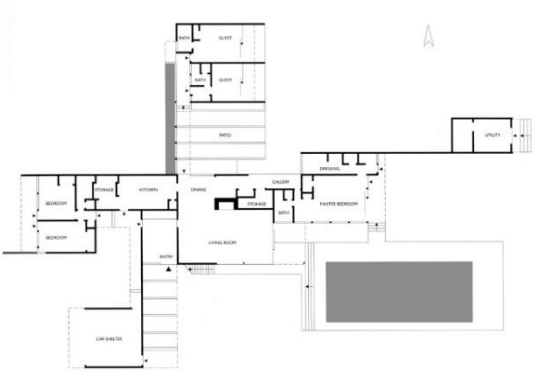

Fig. 77. Richard Neutra, *Kaufman House*. 1946.

Fig. 78. Richard Neutra, *Kaufmann House*. 1946, Palm Springs, California.

> Finally, one can discern the impact of Wright's Wasmuth *Folios* in the alternating bands of ribbon windows and stucco in his elevation for Gale House, Oak Park, 1909, or in the interlocking volumes and "free plan" of the Willits Residence, Highland Park, 1901 (Fig. 75). Neutra also admired Ludwig Mies van der Rohe's far more abstract Project for a Brick Villa, 1923 (Fig. 76).[126]

This interest or inspiration in other modernists of Neutra's time can been seen directly in his Kaufman Residence of 1946 (Fig. 77-78). The splayed, pin-wheel like "free plan" reaches out into the site and grabs ahold of the surroundings. This trick helps to ground the house in its context as well as increase the play between the indoor-outdoor relationships. In Wright's Willits Residence (Fig. 75), the plan uses the central fireplace to anchor not only the 2D composition of the radiating plan, but also it helps to centralize the 3D composition as well. Neutra's Kaufman house does this as well (Fig. 77-78). In Mies's Project for a Brick Villa (Fig. 76), three walls extend well beyond the enclosed area of the house and out into the landscape. These walls therefor extend the house and living space beyond the limits of its covered area. In the Kaufman house, Neutra uses several walls to do the same thing, but his different programed wings of the house also help to create four different courtyards.

[126] Lamprecht, *Richard Neutra: Survial Through Design,* 9

Despite all the similarities between Neutra and other modernists, it was through his constant refinement of these modernist ideas that made his work so special. He was in the same time and place as other well-known modernist architects in California, but yet, he still was able to keep pace with many of them. His work was well known internationally and was multi-dimensional in its relationships with not only modernist ideas of structure, but also regionalist ideas of material and context. The Kaufman House by Neutra was designed for the same Edgar Kaufman as Wright's famous Fallingwater (1935), but when building a house in California, Kaufman turned to Neutra because his houses had a lightness to them that was unique to the character of California, more so than Wright's heavy styled buildings in the west. Neutra was also part of the Case Study House Program along with other Californian modernists and helped perpetuate the regionalist ideas and modernist hopes of the program.

Brazil

It seems that the modern era in Brazil lasted longer than in any other country, or that it never ended at all. Brazil is home to some of modernism's most iconic architecture and largest projects. This acceptance and support for modern architecture by the country and their culture translated into their residential design as well. To this day modernism is still the most prolific style of architecture being built in Brazil. Brazil is home to many internationally known architects such as Oscar Niemeyer and Lucio Costa, but also has a long heritage starting from those great masters reaching into today. But Brazilian modernism is unlike most forms of modernism.

> In the broader architectural world of the last hundred years, Brazilian modernism stands out. It is clearly influenced by organic forms, and abstracts the shapes of lily pads, philodendron leaves, tropical rivers, without a hint of European modernist's suspicion of nature. In this it is in sympathy with the American Organic architecture of Sullivan, Wright, Lautner, and Goff. Ironically, though, there was very little direct interaction between the two schools of architecture. The New World generated two separate though parallel philosophies of design. The rhythms of the tropics are different from those of the upper Midwest, or even California. Still, both show the value of regional sources and inspiration in shaping profound architectures.[127]

Fig. 79. Rene Burri, *Ipanema beach*. 1958, Rio de Janeiro, Brazil.

Fig. 80. Oscar Niemeyer, *Planalto Palace*. 1960, Brasilia, Brazil.

Modernism in Brazil was quickly shaped by both the culture and the landscape of Brazil (Fig. 79). It came at a time when, politically, Brazil was moving up in the world in terms of commerce, power, and economy. It represented a departure from the colonized Portuguese past and was a path for the country to create its own future. Brazil, like many regions of Tropical Modernism, is a lush beautiful landscape, and it was no wonder that Brazilian modernism was quickly shaped to reflect its place.

> The canons of modernism that arose from the ideological struggle of the early twentieth century in Europe insisted on drawing the line between man and nature. Brazil modernism, however, was entirely comfortable in blurring that line.[128]

[127] Hess, *Oscar Niemeyer Houses,* 229
[128] Hess, *Oscar Niemeyer Houses,* 228

This natural landscape is prevalent in the forms of Brazilian Modernism and more so in the work of Oscar Niemeyer. Niemeyer was born and raised in Brazil, schooled in Brazil and the majority of his work is in Brazil – his architecture is as much a reflection of Brazilian culture as dance, art, or music of the country. Niemeyer saw the potential of modern architecture in his country and how it could help bring the country into prosperity. He sought to revolutionize the literal political landscape by bringing Brazil into the modern world. When Modernism first came to Brazil in civic architecture, it was through a joint collaboration between Le Corbusier, Lucio Costa, and a young Oscar Niemeyer. It was a place of political unease and was nowhere close to the Brazil that was to come later.

> But if the economic and political landscape made Brazil an unlikely place for Modern architecture, the natural landscape of Brazil (named after all, for the dye producing Bresil tree) was the ideal inspiration for Niemeyer's revolution. Fly into Santo Dumont airport – the airport perched between downtown Rio and the shore of Guanabara Bay – and you'll see. The landscape in which Niemeyer was born and raised is one of stunning natural power and beauty. As a child he would outline with his finger the shapes of the white clouds and the mountains, wreathed in greenery, rising dramatically over the bay. The white beaches scalloped the shoreline.[129]

This constant contact with the Brazilian landscape shaped modernism in the country as it was growing politically. Nature could never be separated from the architecture as it was not only abundant, it was overpowering its scale and beauty.

> Even Le Corbusier, visiting Rio first in 1929, was impressed, noting the "green flames above the city." The landscape of Brazil is vast, diverse, exotic, and nearly as vast as the continental United States. In the Brazilian landscape humans have no choice but to accommodate nature.[130]

Fig. 81. Marcio Kogan, *V4 House*. 2011, São Paulo, SP Brazil.

Fig. 82. Angelo Bucci, *House in Ubatuba*. 2005-09, Ubatuba, SP, Brazil.

Brazilian modernism flourished throughout the modern era, peaking at the birth of the new capitol, Brasilia, a modern creation planned by Costa and with architecture by Niemeyer (Fig. 80). Because modernism became such a key part of Brazilian identity it still continues today with many great Brazilian modernists like Marcio Kogan of Studio MK27 (Fig. 81), Angelo Bucci of

[129] Hess, *Oscar Niemeyer Houses,* 13
[130] Hess, *Oscar Niemeyer Houses,* 13

SPBR (Fig. 82), and many others. Their work continues to reevaluate the relationship between man and nature in the tropical landscape and the dance between the two is beautifully composed on the backdrop of clean modern lines. Kogan's work consists of long rectangular boxes sited along slopes and overlapping each other. The concrete boxes open up on either side connecting the indoors with the outdoors. Each project uses different means of inclosing the sides in times of inclement weather, through this study in temporary enclosure he brings varied rhythms and cultural backgrounds to his work. His seamless transitions from indoors to out, use of local materials, natural vegetation, and Brazilian crafted furniture makes his homes true representations of contemporary Tropical Modernism. Angelo Bucci uses the same open air concept but elevates it to the trees. His houses, like the one in Ubatuba (Fig. 82), brings the architecture to tree height and through multiple level changes and large concrete structural members that look to be from highway overpasses, creates wall-less cantilevering homes that are connected with the Brazilian environment. His houses use concrete swimming pools for roofs and a De Stijl like placement of walls and floors that pass over, through and beyond each other enclosing spaces and rooms. Both architects use the pallet that is now synonymous with Brazilian modernism – board formed concrete, dark stained local wood, and clean lines that play as the backdrop to the dense green around them.

Oscar Niemeyer (1907-2012)

Overview

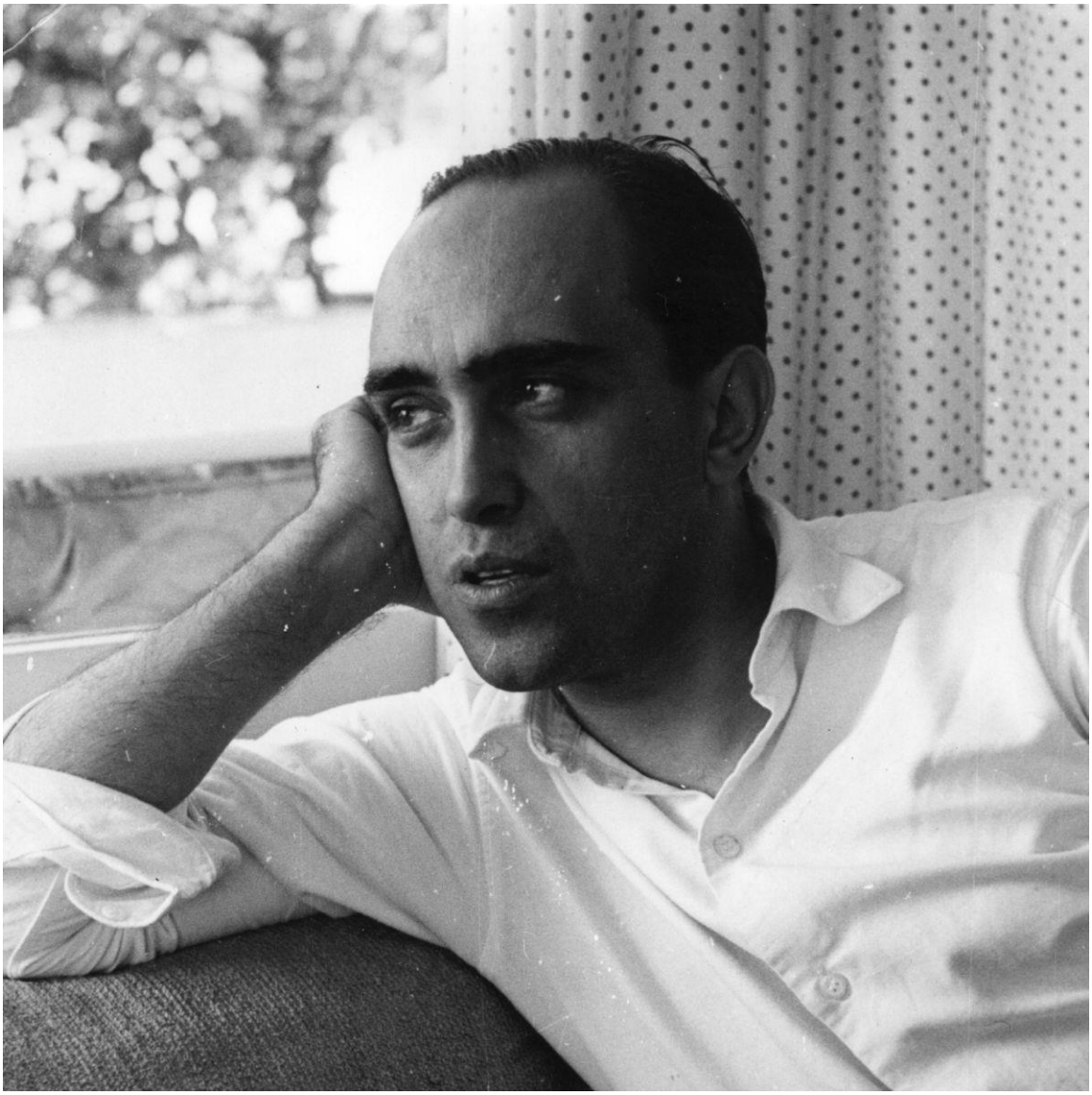

Fig. 83. Kurt Hutton, *Brazilian architect Oscar Niemeyer*. 1950, Rio de Janeiro, Brazil.

Oscar Niemeyer is one of the longest living of the original modernist architects. With a career spanning over seven decades and cumulating to define Brazilian modernism, his projects ranged from entire cities and large civic buildings, to small single-family houses in the hills above Rio. His swooping white curves, formed from concrete, harmonized not only with the mountains and flora of Brazil, but also the movement, culture, and rhythm of their people. When discussing Tropical Modernism, or regional modernism in any form, it is hard not to mention Niemeyer by name. In the mid-century, Niemeyer's work stood for and help to define a growing country's architectural and cultural identity. Oscar Niemeyer, born "Oscar Ribeiro Soares or Oscar Riebeiro de Almeida de Niemeyer,"[131] was born in Rio in 1907. He was a gifted artist and chose

[131] Philip Jodidio, *Oscar Niemeyer: The Once and Future Dawn* (Koln: Taschen, 2012), 8.

architecture as a career for the reason that he enjoyed drawing. He was more gifted at football than any academic subjects, but he attended the National School of Fine Arts in Rio for his "five trouble-free years"[132] of university. After his third year he sought different jobs in the profession but didn't want to settle down with the commercial architecture that surrounded him. Instead he worked for free for architects Lucio Costa and Carlos Leao. These internships would have a profound effect on his later career and was what sent him on the path of modernity. Lucio Costa was born in France but raised in England and Switzerland before attending the same school that Niemeyer was attending. After college he traveled Europe where he came into contact with work by Le Corbusier. Inspired by his contact with Modernism and Corbusier, Costa came back to the school in Rio and was appointed director, dismantling the Beaux Arts curriculum in favor of Modernist ideals. Costa was eventually forced to resign from directorship of the school, and Niemeyer's decision to go work for him represents his own dedication to modernism and willingness to take risks in his thirst for change.[133]

The first large project that Niemeyer got the chance to work on with Costa, came to be one that would define the rest of his career. In 1936, Lucio Costa received the commission to design the new headquarters for the Ministry of Education and Health in Rio (1936-46) (Fig. 84). He received the commission after another architect had won the design competition for the project with a neocolonial design. The public and the minister, Gustavo Capanema, thought that the design didn't reflect Brazil's new forward thinking mentality – so they turned to Costa's modernism. In turn, to help with the initial design, Costa turned to Le Corbusier as a consultant.

> As Niemeyer describes the events: "I did a great deal of work with Le Corbusier … but our first contact was in 1936 in Rio. He drew up two plans for the Ministry of Education and Health, one for an ideal site near the ocean, the other for the downtown area that was ultimately chosen. This second design was then developed by the team I was on and that Lucio directed." Costa, Niemeyer, Affonso Reidy, Jorge Moreira, Carlos Leao and Ernani Vasconcelos thus gave form to a seminal structure in the history of Brazilian architecture, the first significant Modernist public design in the country. "We have always acknowledged the Ministry of Education design as being the work of Le Corbusier," notes Niemeyer. "On the commemorative plaque we wrote: 'In accordance with the original sketch by Le Corbusier.' In architectural vocabulary, the sketch is the original outline, the basic idea, the architectural invention." That said, Niemeyer's personal work as a draftsman for the Swiss architect gave him a leading role in the project and as Costa duly noted: "Le Corbusier's greatest legacy was Niemeyer himself."[134]

[132] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 9
[133] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 9
[134] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 10

Fig. 84. Le Corbusier, *Ministry of Health and Education.* 1936-46, Image taken 1950, Rio de Janeiro, Brazil.

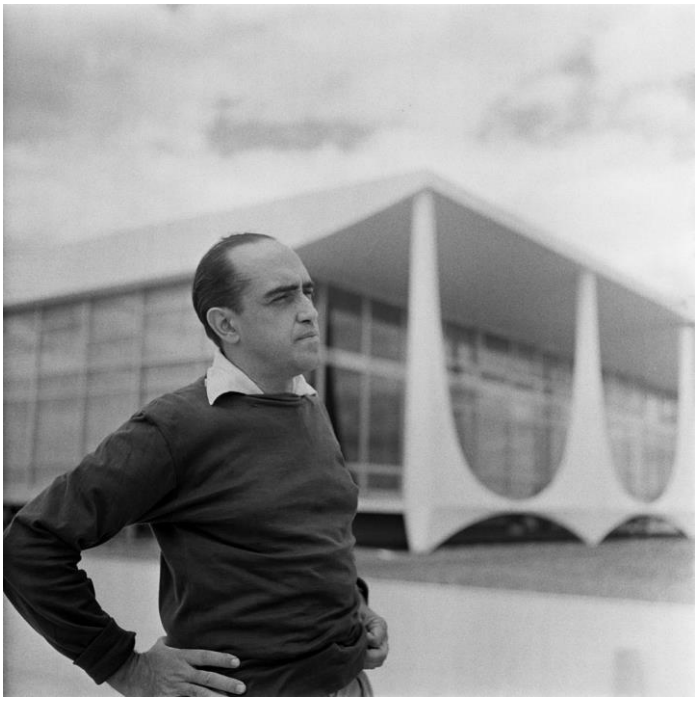

Fig. 85. Oscar Niemeyer, *Niemeyer standing in front of the Alvorada Palace*. 1957, Brasilia, Brazil.

The Ministry of Education and Health was a huge stepping stone for Niemeyer, and introduced him to not only Le Corbusier – whom he later collaborated with again on the United Nations Headquarters in New York (1952) – but it also introduced him to many of Brazil's up-and-coming political leaders. In 1940, four years after the Ministry of Education and Health was completed with Costa and Corbu, Niemeyer was asked by the Juscelino Kubitschek, the then mayor of Belo Horizonte (former capitol of Brazil) to design a new area for his city along a manmade lake called Pampulha. Niemeyer designed many buildings for this new resort town and started experimenting with the curves that would come to define his architecture. Kubitschek would eventually come to be elected as president of Brazil and soon after asked for Niemeyer's help to design a new capitol for their country, named Brasilia (Fig. 85). As the story goes, it was actually after visiting Niemeyer's own house in Canoas, that Kubitschek told Niemeyer, with excitement, his ideas to build Brasilia. Niemeyer had many works that came to define his career, as he explains his career,

> I divide my architecture into five stages: Pampulha; from Pampulha to Brasilia; Brasilia; my international experience; and finally, my later designs."[135]

These five stages spanned many ages in architecture and politics for Brazil, but Niemeyer's consistency to his culture and its representation through architecture made him one of the last great masters.

[135] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 18

Comparison to Factors

The architecture of Niemeyer creates a regional language not only through the abstract, curvilinear forms that relate to the culture of his country, but also to other common factors of regionalism – material, climate, setting, and environmental living. Though the majority of Niemeyer's work was spent on his larger commissions, which defined his career, he was also known for several houses. Namely the architect's own house in Canoas, above the Sao Cornado area of Rio built in 1952 (Fig. 86). This house, primarily will be looked at in how it relates to the regional factors set forth by Seckel. Niemeyer also designed several other houses that though did not give him such public acclaim, still are beautiful examples of Tropical Modernism in Brazil. The Edmundo Cavanelas House of 1954 (Fig. 87) is also a wonderful example of Niemeyer's work. In both houses, as well as much of his work, there is a large sculptural roof, under which volumes are enclosed for habitation space. The settings of these two works however, lead Niemeyer different opportunities to express new and different ideas. These two residences are also built in collaboration with landscape architect Roberto Burle Marx, a well know Brazilian designer.

Fig. 86. Oscar Niemeyer, *Canoas House*. 1952, Image taken: 2010, Canoas, Brazil.

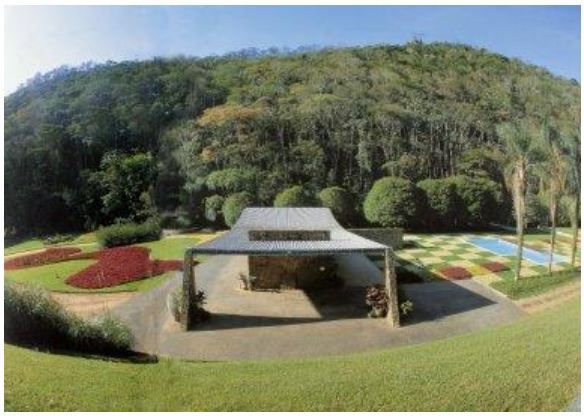

Fig. 87. Oscar Niemeyer, Edmundo Cavanelas House. 1954, Pedro do Rio, RJ, Brazil.

Material

Like most modernist architects, Niemeyer used steel, glass, and concrete to enclose their spaces due to its technological advances that came about at their time. It allowed Niemeyer, especially, to use the plastic qualities of concrete to create curving, doming and arching shapes in his architecture. These sculptural forms kept each design that he made as if it were a piece of art, set against its setting. When he did many buildings in each area, from afar it could be seen as a sculpture garden, each building playing in relationship to the others. Concrete was a liberating material for Niemeyer, it turned his buildings into art. But at a closer scale, a residential scale in particular, Niemeyer implored other materials to give his buildings a more human, natural and referential quality. In his own home in Canoas, not only does a natural rock outcropping enter the living space and connect indoors and out (Fig. 88), but Niemeyer also uses other materials to continue this connection between out and in. The seating nook (Fig. 89) in his house "Is paneled in thin strips of wood as unaffected as a beach stockade of sticks driven into the sand as a refuge from the wind."[136] The tiles on the floor also extend from the outdoor patio straight into the living space without any change in elevation or finish. Niemeyer knew of the cultural implications of material and what it meant in Brazil to use a material in a certain way. The

[136] Hess, *Oscar Niemeyer Houses,* 92

tropical climate allowed for this indoor-outdoor connection so Niemeyer put it front and center in the building's forms. He the covered this connection with a sculptural concrete roof that floats above the spaces like a raised topographic line or the canopy of the surrounding trees.

Fig. 88. Oscar Niemeyer, *Brazilian architect Oscar Niemeyer seats with his wife Annita Niemeyer*. 1958, Canoas, Brazil.

Fig. 89. Oscar Niemeyer, *Canoas House*. 1952, image taken: 2006, Rio de Janeiro, Brazil.

Again in the Cavanelas House, Niemeyer uses materials of his country to create a harmony not only with the place, but the people. The roof structure of the Cavanelas House is a steel truss that is hung in suspension between four stone pylons. Along with these four stone supports are two stone walls that divide the interior space. These walls extend out beyond the roof covering and connect out into the landscaping (Fig. 90). With nothing other than the glass wall that divides in from out, the living room expands into the site. The underside of the roof structure is clad in thin strips of wood, like seen in the Canoas house along some walls to give warmth to the interior. Stone walls are not typically thought of as a "modern" material, but the way in which Niemeyer executes it, is quite modern in plan. However, Niemeyer also used it for its historical references.

> The value of history is another theme revealed in these houses. In his autobiography in the 1990s, he still remembered the early impression of colonial buildings: "so sober and rigid, with their thick walls of stone or taipa de pilao (gravel-clay wattle), their gently sloping slate tiles contrasting with their whitewashed walls. As far as architecture was concerned these buildings had nothing to offer but a good example. They were honest beyond reproach, as we all should be."[137]

[137] Hess, *Oscar Niemeyer Houses,* 229

Fig. 90. Oscar Niemeyer, Cavanelas House. 1954, Pedro do Rio.

Climate

There seems to be no special device that Niemeyer used in his architecture to deal with ventilation. Ossipoff had his sill vents bellow his windows to always allow ventilation. Rudolph had walls of glass jalousies to regulate wind flow. Even Neutra with his long expanses of glass found ways to let air in without obstructing the visual connection between in and out. In terms of natural ventilation, Niemeyer's houses are left rather open to allow a steady air flow. The glass volumes enclosed under his sculptural roofs could be slid open with large glass doors, or like in his Canoas house, were left open with no front door. Light, and solar radiation however was a climatic concern of Niemeyer. Creating shade from the Brazilian sun was a main driver for almost all of his architecture. His Copan Building in 1951, which was a large mixed-use apartment building for 1160 apartments in Sao Paulo, is largely defined by its massive bris-solei (Fig. 91). Even his design for the Ibirapuera Park in Sao Paulo is largely defined by its concrete canopy that connects all of the different park buildings (Fig. 92). Many of his other large-scale projects use creative ways to incorporate a shading device of some sort into the façade that helps to define the overall aesthetic. His houses are no exception. Because Brazil lies just below the equator, the sun shines on the northern façade for the majority of the day, if not from right above. As you can see in the way that the Canoas House is laid out, the larger roof overhangs are on the north side of the house, and bedrooms open out to the south to allow in indirect daylight (Fig. 93-Fig. 94).

Fig. 91. Oscar Niemeyer, *Copan Building*. 1951, Sao Paulo, SP, Brazil.

Fig. 92. Oscar Niemeyer, *Ibirapuera Park*. 1951-2004, Sao Paulo, SP, Brazil.

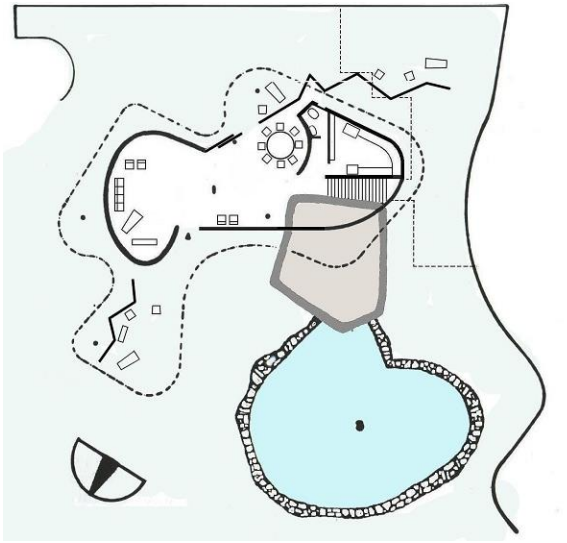

Fig. 93. Oscar Niemeyer, *Canoas House, Main Floor Plan*. 1952, Canoas, Brazil.

Fig. 94. Oscar Niemeyer, *Canoas House, Lower Level Plan*. 1952, Canoas, Brazil.

Setting

The setting of Brazil, like most tropical locations, is known for its dense rain forests, beautiful sandy beaches, and wild mountain ranges that spring up out of the sea. But, it is also has centers of dense urban living of varying economic conditions. But whether in the center of a city or in the center of a mountain top forest, Niemeyer's architecture is well influenced and in a conversation with the site. Niemeyer's Canoas House is a prime example of this relationship with the setting, as Philip Jodidio explains about Niemeyer,

> At an age when many architects have done little more than work as assistants, Oscar Niemeyer had become something of a star in his own country by the early 1940s. In 1942, while he was working in Pampulha for Kubitschek, Niemeyer built his first home (Architect's House in Logoa) in the Fonte da Saudade area of Rio. In a curious inversion of the situation of many cities, Rio's poor have traditionally inhabited its highest points, but Niemeyer selected a steep hillside with a spectacular view for his house. Though also modest in dimensions, the architect's next house would be a much more aesthetically ambitious project. Located above the Sao Cornado area of Rio on the forested Estrada das Canoas,

> this house is well preserved, as is its immediate area, so it can still be appreciated much as Niemeyer originally intended. Again, the architect went against local custom and selected a high site, with just a glimpse of the city below through the dense vegetation. Restored in 1995, the Canoas House belongs to the Oscar Niemeyer Foundation. The curves of both the building and the pool are interrupted by the strong presence of the very rock that the city rests on. A thin layer of concrete forms the roof over the glass volume of the main floor, with more private bedrooms located below. Here, concrete, glass, and steel are bent to the inevitable will of the earth, and, against all odds, remain thoroughly modern. Neither refusing nature nor imitating it, Niemeyer plays the music of his native land, but his message is more than purely Brazilian.[138]

As can be seen in the picture of Niemeyer standing in front of his house (Fig. 95), the roof lines play with the mountains in the background, mimicking and responding to their lines. Transversely, in the picture of the house in response to the rock outcropping (Fig. 96), the house takes on a more intimate relationship with its immediate surroundings. This relates back to his other work and how it plays with the site as a work of art, both a sculptural form on a macro scale, and an intimate relationship on a micro scale. As Jodidio says, "Rather than imposing geometric regularity on a site with no straight lines, Oscar Niemeyer makes his architecture dance with nature."[139]

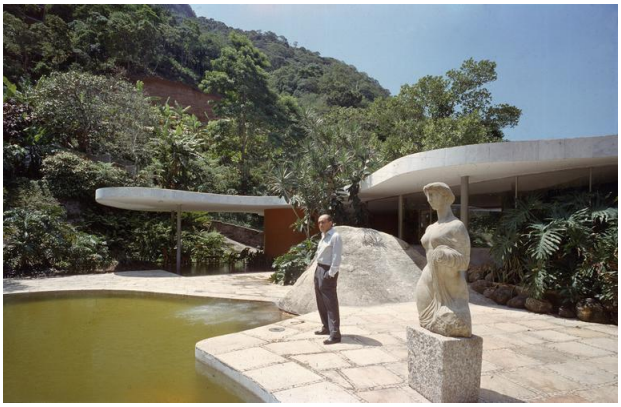

Fig. 95. Oscar Niemeyer, *Oscar Niemeyer stands near the edge of a pool*. 1958, Rio de Janeiro, Brazil.

Fig. 96. Oscar Niemeyer, *Canoas House*. 1952, Rio de Janeiro, Brazil.

This intimate relationship with the site was enhanced by landscaping by Roberto Burle Marx, of which Niemeyer and he collaborated on many projects together. In the Canoas house, Marx enhances the natural beauty of the forested site, letting the trees tower beyond the height of the house. Also incorporates planter areas both inside and outside of the glass enclosure. The landscaping also steps down the site and includes many different art pieces of prominent Brazilian artists, friends of Niemeyer. The interplay between hardscape and dense vegetation lets one explore the forest but stay dry from the common rain showers. This nuanced and irregular, organic relationship is one of the things that sets this house apart from other

[138] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 45-46
[139] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 12

modernist dwellings. Niemeyer tells a story of one of his colleague's impressions upon visiting the house.

> I remember one of the most famous Bauhaus personalities, Walter Gropius, who after visiting my home up in Canoas, many years ago, burst out and said: "Your house is very beautiful but it is not multipliable." How can a house that is so well adapted to the irregularities of the terrain be multipliable, and what about the structural "purity?"[140]

To Niemeyer, of course, it wasn't about multiplicity, or structural purity, it was about the relationship not only of architecture and site, but man and nature. Each site was different, and Niemeyer made sure that each response was different from project to project.

Culture

Many architects of Tropical Modernism bring inherited culture to their designs that give their projects a certain sensibility that is in tune with the tropical lifestyle. For example, Japanese architecture has a major influence on the work of Richard Neutra of California and Vladimir Ossipoff of Hawai'i. Both of these architects spent time there and brought back what they learned to their architecture. It wasn't always the culture of their clients or of their site, but it was their inherited culture that manifests themselves in their work. Niemeyer is different however. Niemeyer was born and raised in Brazil, lived there for the majority of his life, was educated there, and the majority of his projects were in Brazil. The only culture that he brought to his work was his own – Brazilian – and this compounded with the culture of his projects locations, and program, made his work explicitly Brazilian in every fashion. His architecture represents Brazil in the same way art, music, and cuisine represent its culture. As Jodidio explains about this cultural connection,

> Because of his role in Brasilia, his other accomplishments, as well as his exceptional professional longevity, Oscar Niemeyer is one of the very few modern architects whose name is commonly known to the people of his own country. In 1988, he received the coveted Pritzker Prize. The citation from the Pritzker Jury at the time read in part: "There is a moment in a nation's history when one individual captures the essence of that culture and gives it form. It is sometimes in music, painting, sculpture, or literature. In Brazil, Oscar Niemeyer has captured that essence with his architecture. His building designs are the distillation of colors, light and sensual imagery of his native land … Recognized as one of the first to pioneered new concepts in architecture in this hemisphere, his designs are artistic gestures with underlying logic and substance. His pursuit of great architecture linked to roots of his native land has resulted in new plastic forms and a lyricism in buildings, not only in Brazil, but around the world."[141]

Niemeyer learned modernism from Lucio Costa and Le Corbusier, but at a time when modernism was strict right angles and machine like precession, Niemeyer was one of the first to recognize the need to add cultural references that gave life to the design. The cultural references were not necessarily historical references or ornamentation – ideas that modernism

[140] Oscar Niemeyer, *Oscar Niemeyer* (Sao Paulo: Editora Almed Ltda., 1985), 72.
[141] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 18-19

were trying to rid themselves of – instead they represented non-architectural references. This departure from the right-angled restrictions of modernism can first be expressly seen in Niemeyer's projects in Pampulha.

> The curves of Pampulha are central to understanding Niemeyer's originality and interpretation of Modernism. Setting aside the "honest right angle," Oscar Niemeyer assumed his own heritage, whether in the form of Rio's mountains, or in a broader sense. He admits this clearly when he writes: "I am not attracted to straight angles or to the straight line, hard and inflexible, created by man. I am attracted to free-flowing sensual curves: the curves that I find in the mountains of my country, in the sinuousness of its rivers, in the waves of the ocean, and on the body of the beloved woman. Curves make up the entire Universe, the curved Universe of Einstein." More than an aesthetic judgment, this statement is almost an autobiography in itself. Whether a woman's body or Brazil's nature are his inspiration, Niemeyer's art flows from what he is, a sensualist, a lover, and, indeed, not a Purist, even if Le Corbusier and others set him of the path of modernity.[142]

For Brazil, and for Niemeyer, the curve was the liberating line that tied his architecture to his culture. He incorporated this with bold colors, modern art, and the dense vegetation of his country. The curve is what Niemeyer's architecture came to be known for – it is his signature. But he doesn't use the curve all the time, he knows that to best express a curve it needs to be in juxtaposition to a straight line. And whether that straight line comes from the horizon or the vertical gestures of his towers, Niemeyer's curved architecture is in composition with the straight bones of modernity. As Niemeyer says in his own words,

> Everything started when I began the Pampulha studies – my first phase – deliberately despising the exalted right angle and the rationalist architecture made by ruler and square, to boldly enter this world of curves and straight lines offered by concrete," wrote Niemeyer. "And it was on paper, while drawing these designs that I protested against the monotonous and repeated architecture…. The intended protest rose from the environment where I lived, with its white beaches, its huge mountains, its old baroque churches, and its beautiful tanned women. I did not only carry Rio's mountains with me, as Le Corbusier used to say, but everything that touched me."[143]

Environmental Living

The environmental living factor of tropical regional design is about the integration not only of nature into and around the home, but of the integration of the people themselves into that nature. There needs to be a visual and physical connection between nature and man in the tropics that becomes an everyday occurrence – in essence, creates a lifestyle. Niemeyer achieves this not only in his civic and larger projects, but also his residences. In the two photos below from his Canoas House (Fig. 97-Fig. 98), Niemeyer creates a space to appreciate the nature found on the site. This outdoor patio space is covered by the same roof as the rest of the house, and by using the same materials creates a seamless transition from indoor to out. By

[142] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 11-12
[143] Hess, *Oscar Niemeyer Houses,* 23

treating this outdoor space as the same finish quality as indoor space, he creates an area that is cool and comfortable to be in, but simultaneously immerses the user in nature. This space overlooks the pool on one side and the mountain emerging from the site on the other. In effect, giving the whole mountain to ocean experience that can be found in the Brazil. This outdoor transition space can be seen in the Cavanelas House (Fig. 90) as well, where the roof overhang and protruding wall enclose another room outdoors.

Fig. 97. Oscar Niemeyer, *Canoas House*. 1952, image taken: 2006, Rio de Janeiro, Brazil.

Fig. 98. Oscar Niemeyer, Canoas House. 1952, Canoas, Brazil.

Comparison to Modernism

Oscar Niemeyer was taught modernism by Lucio Costa and Le Corbusier, but his own form of modernism turned out to be something completely unique. His departures created a unique style of his own and a unique style to Brazil. It lies in the Tropical Modernism category, but still creates its own path a manifestation that other Tropical Modernists had difficulty with. He had the similar connection to nature as other Tropical Modernists, but he also had abstract representation of nature as well. This form and function relationship to the tropics is unique. As Hess explains about Niemeyer's modernism and its roots in Le Corbusier's modernism,

> Since the 1920s, certain artists and architects in Brazil had been seeking a genuinely Brazilian expression. The power of the place, embodied in the native architects, set up a creative tension with the rationalist ideas of the International Style.
>
> Brazilian modernism emerged as a distinctive alternative to the modernist expression that evolved in Europe. Certainly Brazil had every opportunity to pick up the European ideas; Le Corbusier visited Brazil in 1929 to lecture and offer urban planning suggestions, planting the seeds in young architects minds (notably Lucio Costa's) that would bear fruit seven years later when he was invited back to design a new building for the Ministry of Health and Education. The cultured Costa had first responded negatively to the Modern ideas, but within a year he had embraced the new thinking.
>
> Niemeyer's search was not for more logic and purity in architecture, nor more efficiency of systems and parts. His was an exploration of art and imagination. He began this search with Le Corbusier, a primary source of European modernism, but he pointedly rejected Corbu and moved on.
>
> He did use rational process in his designs. "This need of better elucidating my design drove me into a very particular working process. When I come to a solution, I describe it in an explanatory text. If after reading it satisfies me, I

> start the definitive drawings. If otherwise, (and) the arguments do not sound to me reasonable, I return to my drawing board. It's like an acid test." But the forces of the country and landscape in which he lived proved in the long run more powerful and more fruitful."[144]

Niemeyer didn't just leave Le Corbusier's concepts of modernism for superficial reasons, it was a realization that the alienating modernism of Europe couldn't exist in the nature of Brazil. "Where Le Corbusier set his buildings in contrast to nature, young Oscar learned the pleasures of sensual forms and good living in a benign climate."[145] And "When the aridity of Le Corbusier's purism was based on a mental construct of almost mathematical precession, Oscar Niemeyer showed that modernity did not have to be divorced from nature nor from sensuality."[146]

Niemeyer's work can also be compared to other architects in the US, who were also experimenting with Tropical Modernism and more nature-orientated architecture. Architects in the US were realizing that modernism wasn't a new order to impression their architecture to machine like precession, but liberated their designs to reach out into their surroundings. Despite their similarities, the way in which Niemeyer achieves this is quite different than the Americans. An example is comparing John Lautner and Niemeyer's Canoas House (Fig. 99-Fig. 100).

> In the United States, modern architects like John Lautner (1911-94) would later make use of their sites and natural rock outcroppings too, but where Lautner skillfully imposed modern forms on the roughness of nature, Niemeyer wholeheartedly opened his arms to the sinuous shapes of Rio and its abundant, dense nature. The Canoas House is at once thoroughly modern and also completely integrated into its rocky site with its junglelike vegetation. It might be asked today if the lessons of the Canoas House were ever fully absorbed and understood by contemporary architecture.[147]

Fig. 99. Oscar Niemeyer, *Canoas House*. 1952, image taken: 2006, Rio de Janeiro, Brazil.

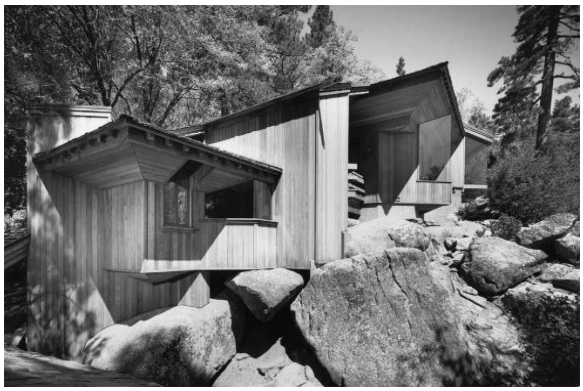

Fig. 100. John Lautner, *Wolff (Marco) House*. 1961-1963.

Niemeyer also explored modernism in three other ways. There was of course the international style of modernism, but also a regional, historic referential modernism, and an abstraction of

[144] Hess, *Oscar Niemeyer Houses,* 229
[145] Hess, *Oscar Niemeyer Houses,* 14
[146] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 45
[147] Jodidio, *Oscar Niemeyer: The Once and Future Dawn,* 46

nature modernism. Niemeyer was able to experiment with all three forms of modernism at different times in his career and when the project called for it.

> The ambivalence and contradictions of Brazil, however, also allowed Niemeyer to blend ideas and forms poetically. These voluptuous houses were one part of a continuous romantic landscape to be enjoyed and lived in, thanks to these designs. Their rhythms are orgiastic, breaking through to wild levels and surrealism, quite unlike the perfection and control of Philip Johnson's Glass House. It is thus fortuitous that Brazil's climate and labor force allowed concrete to be his favored medium.
>
> He saw himself as a concrete revolutionary. "People talked about 'purism' – about the 'machine for living in,' 'less is more,' 'functionalism,' and so on – without understanding that all this would be derailed by the plastic freedom made possible by reinforced concrete. Contemporary architecture was vanishing through its repetitive glass boxes."
>
> Niemeyer the artist remained fruitful and exploratory. His houses show a languorous, confident freedom of imagination, revealed in his drawings. Sketched free-hand, usually on large pieces of architectural tracing paper, the economic lines show Niemeyer's mental process of editing the design down to a few telling and artfully suggestive lines. The buildings would be built in the hard weighty dimensions of brick, stone or concrete, and yet the simplicity of the sketches were usually still evident in the easy gestures and intuitive poetry of a few perfectly placed walls and well limned curves."[148]

Niemeyer's sketches represent the initial concept or idea, and they relate to these different explorations in modernism. Sometimes it was about representing nature, other times it was about functional or structural clarity, and other times he saw the need for historical reference in order to respond appropriately to his context. As Hess talks about Niemeyer's exploration into the both functional and historical referenced modernism,

> Later houses show Niemeyer's powerful exploration of free form and open space, in a series of houses that stand comparison with the best known statements of the Modern residence in the world: with Philip Johnson's glass house in Connecticut, with Wright's Fallingwater, with Alvar Aalto's Villa Mairea. Other houses illuminate Niemeyer's deep appreciation of historical architecture, especially the Portuguese colonial architecture of eighteenth-century Brazil, and the plantation homes and fazends of the Brazilian interior. Seeing these frank and appreciative essays in the hands of a Modern master, we come to a greater appreciation of the evolutionary role of Niemeyer, who did not reject the past as abjectly as the theorists encouraged.[149]

Niemeyer's main exploration in modernism was his abstraction of nature. This is his reinterpretation of the nature found around him in Brazil, manifested in architectural form. This is different than the way other Tropical Modernists expressed their place. In a comparison between the Sri Lankan architect Geoffrey Bawa and Niemeyer and their relationship to site,

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[148] Hess, *Oscar Niemeyer Houses,* 229
[149] Hess, *Oscar Niemeyer Houses,* 13-14

> Nowadays, even the most devoted adherents of Modernism would pay some attention, respects even, to the terrain. Niemeyer and Bawa had distinctly different responses to the tropical landscape in their designs, but both are unquestionably "of" the tropics – Bawa in his references to traditional building styles and attention to ventilation and light patterns, and Niemeyer in his somewhat outlandish forms that approximate the more spectacular botanical specimens of the rainforest.[150]

Niemeyer's exploration into different branches of modernism kept his ideas fresh and unique. In the end they distilled down to a specific type of Tropical Modernism that not only integrated all the other common factors – climate, material, setting and environmental living – but also had a clear and deliberate reference to culture.

[150] Powers and Richardson, *Living Modern Tropical: A Sourcebook of Stylish Interiors*, 68

Australia

Australia is a tropical country, but with its main region lying within 10° and 30° South, its climate is closer to that of Northern Africa and other desert regions lying either within 15° – 25° North or South. The vast flatness of the land and minimal rainfall meant that development of most of the country was rather slow. Australia was colonized by people of European decent whom are accustomed to reliable rainfall and cold winters, Australia was quite a different place. Through the mining of minerals and developments in agriculture science, Australia was slowly developed around these areas of industry. These areas were isolated and remote, leading to their architecture being very functional, cost effective, and durable, comfortable buildings made for the climate. These rural areas developed differently than the colonized areas, where the imported architecture from Europe had to be retrofitted to accommodate to Australia's harsh climate. It was this new rural vernacular architecture that was being developed in the isolated areas that struck a finer cord with the climate and environment of Australia, a type of architecture that would later be reevaluated with modern canons.

> During the late 1960s and early 1970s, Australian architects were beginning to appreciate the very direct functionalism that had developed – in parallel with the building types imported during the Colonial era – in agricultural and industrial structures where nobody had fussed about style: barns, warehouses, hot-houses and, above all, the woolsheds and shearing sheds dotted around towns and the outback, which were now seen as signs of Australia's principal economic activity, agriculture. Unlike Colonial house types – bungalows and villas summarily adapted to the climate by the addition of awnings and verandahs – the newly rediscovered rural buildings were perceived as thoroughly pragmatic responses to the constraints and possibilities of the Australian landscape.[151]

Fig. 101. Jørn Utzon, *Sydney: Opera Hall: Ext.: general view*. 1956-58, Sydney, Australia.

Fig. 102. Glenn Murcutt, *Kempsey Farmhouse*. 1975, Kempsey, New South Wales.

The period from roughly 1975-1990 was a creative time for Australian architecture where ordinary Australians and ordinary materials were given value. It was marked by several events. One, predating this period was the opening of Jørn Utzon's Sydney Opera House (Fig. 101), a modern masterpiece that put Sydney on the map in many ways. The other was in 1975 when Australian architect, Glenn Murcutt finished his Kempsey Farm House (Fig. 102). The Sydney Opera House put modernism in the minds of the Australian public like nothing before, but

[151] Francoise Fromonot, *Glenn Murcutt: Buildings + Projects 1962-2003* (London: Thames & Hudson Ltd, 2003), 32.

Murcutt's farmhouse reimagined what modernism meant in Australia. Modernism came late to Australia as opposed to other regions in the tropics. Instead of modernism showing up in the 1930s-1950s with early masters, it came later from the 1960s-1970s and continues today. This late integration of modern architecture coincided with many things political in the country, as it happens in many regions where modernism flourished. Not only was there much political reform that steered the country away from its colonial status and sought to give Australia the right to its own future, there was also much in terms of civil rights for the Aborigine's during this period as well. There was an overall feeling that Australia needed to be authentic to itself, getting rid of European influence and history and looking to the vernacular and indigenous for inspiration on what makes Australia unique. As described by Fromonot,

> If, from the late 1960s, architects in Sydney began to take an interest in the anonymous structures built by colonial settlers in the outback, Aboriginal culture was also making itself felt at that time. As Australia's first inhabitants, whose place had literally been taken by Europeans from the late 18th century, Aborigines had already begun campaigning for their social, political and land ownership rights to be recognized. They were granted Australian citizenship following a referendum in the mid-1960s, then their right to repossess some of their ancestral lands was written into the program of reforms introduced in 1972 by the Whitlam government (which sought to rid Australia of remaining vestige of its colonial status). Some Australian city dwellers began to want to know more about Aboriginal traditions, notably their art, and the desire for reparation was accompanied by a growing awareness of the rich complexity of a 40,000-year-old civilization unique to Australia.[152]

The 1960s did bring the influx of the International Style to Australia, but with the social awakening that happened in the 1970s, local architects began to rethink culturally how their architecture should be defined. During this 15 year period from 1975-1990, Australian architecture could be called just that – there was a new birth of architecture in Australia that had commonalities from architect to architect. This couldn't be said of other countries of the world, were there is no 'American Style' as each architect in America created their own style. Australian architects sought to create an Australian architecture. And for a time, they did. One that was referential to the rural vernacular, one that sought to re-associate itself with Aborigine culture, and one that sought to connect with Australian environment climatically.

Murcutt's Kempsey Farmhouse, or Marie Short House, was the start of this. Its publication and notoriety among architects at the time really started the conversation of what is Australian modernism, or what is Australian architecture? It was Miesian in plan but had the outward appearance of a barn or wool shed. The roof form and detailing of the structure was that of rural architecture, made for economy and function. The operable façade made it a climatic machine, set to work with the environment, not against it. It was at once both referential to the vernacular while not being nostalgic. It wasn't the romantic idea of what Australian modernism should be, it was a manifestation of its purity. This connection to place and this seeking for authenticity and uniqueness to architecture is in line with Tropical Modernism – the connection to nature and the environment is a product of this place-based design philosophy.

[152] Fromonot, *Glenn Murcutt: Buildings + Projects 1962-2003,* 37-39

Another important architect of Australia is Richard Leplastrier (Fig 103-Fig. 104), Murcutt's associate at the University of Sydney in the 1970s. Richard Leplastrier's work is more in line with other Tropical Modernists, consisting of multiple cultural backgrounds and references, as well as incorporating vegetation and lush landscape into his designs. As opposed to Murcutt's work which sought to be uniquely Australian, building in the rural outback, Leplastrier's sites are more tropical in nature and his buildings are more Japanese in their sensibility. His Japanese influence in his architecture was from his time working there, which he joins with his shared interest in sailing and ships with Murcutt into tropical buildings that work like hand crafted yachts in their environment. His work represents Tropical Modernism in a broader sense, of both Australia the place and Oceania and the Pacific, the region.

Fig 103. Richard Leplastrier, *Rainforest House*. 1988-91, Mapleton, Queensland, Australia.

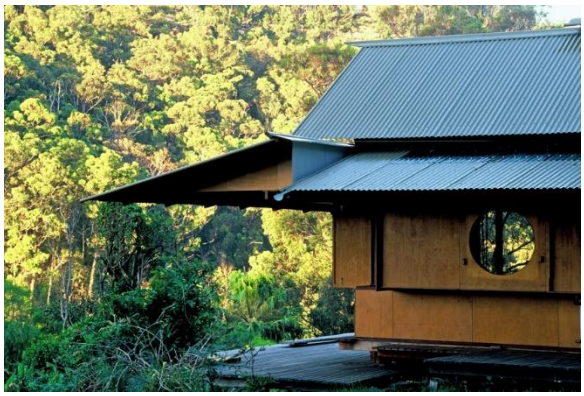

Fig. 104. Richard Leplastrier, *Lovett Bay House*. 1994, Lovett Bay, Pittwater, Sydney.

Glenn Murcutt (1936-present)

Overview

Fig. 105. Glenn Murcutt. 2011.

Glenn Murcutt represents a very authentic and critical approach to Tropical Modernism and critical regionalist architecture. His work is not only strictly in Australia, but he constantly questions what it means to design in Australia. This critical perspective and inquisition into place based architecture stems from his childhood and his experiences in the Australian bush and in New Guinea – but it also comes from his own observations and questions about the architecture of his country. Like Oscar Niemeyer, who was Brazilian, designed for Brazilians, and worked in Brazil, manifesting itself into a cultural-regional architecture, Murcutt is similar in many ways. His work is in Australia, for Australians, and is based on both vernacular and indigenous architecture of Australia, making a critically uniquely Australian archetype. The genesis for Murcutt's love and knowledge of Australian nature and architecture came from Glenn's father, Arthur Murcutt. Arthur Murcutt appreciated architecture and built many houses during Glenn's childhood. He would subscribe to popular American architecture magazines, most notably Architecture Record, and make the young Glenn read them thoroughly and explain the projects to him. But it was also Arthur's love of nature that had the most effect on Glenn. Arthur ran away from home at the age of thirteen to move to the countryside and later to Papua and New Guinea. Glenn was born in Australia in 1936 but was raised the first several years of his life in New Guinea.

> The genius of New Guinea accompanied Glenn Murcutt from his childhood. Its character informs much of his architecture after 1974, or thereabouts. It was the similarities between the landscape of the Upper Watut and the Maria River at Crescent Head which awakened slumbering memories from his childhood and

> thereby contributed a powerful tropical character to the Marie Short farmhouse. Glenn Murcutt was five when his family returned to Australia, however, the experiences from those early years profoundly affected his later life and architecture.[153]

Arthur Murcutt taught Glenn much about the Australian outback and the flora that lived there – this knowledge later effected Murcutt's architecture in both concept and placement. Glenn studied at the University of New South Wales and worked at several architecture offices of the period between 1956 and 1961. During his life there were two major world tours that Murcutt went on that would have lasting effects on his later architecture. The first was around Europe, where he not only came into contact with Alvar Aalto's architecture – a major influence to Murcutt – but also spent time in Aegina, Greece. Aegina was moving to Murcutt for its uniformity and consistency of its architecture – which was place based. The all-white painted buildings, streets and even tree trunks was due to the abundance of lime in the area and its maritime connections. This first trip taught him about Modernism in Europe. Murcutt's second trip taught him something else.

> … The second trip contributed towards a clearer definition of his values that somehow deepened and reshaped his vision of the potential of architecture. It enlarged its scope enabling him to respond to the physical and cultural settings of his buildings without the intervention of some *a priori* aesthetic. On a more personal plane, Glenn Murcutt recognized how architecture can effect emotions. In the houses which followed, he contrived settings which contributed to a feeling of serenity and harmony with the surrounds. Underlying much of this was a new found confidence in the authenticity of his responses. For, as one begins to understand the magnitude of Glenn Murcutt's achievement in defining an Australian form, one is also made aware that the basis of it is a poetic feeling for the landforms, the genius of the plants, and an appreciation of climate. Such architectural forms as he created expressed the aura of Australian places, and were inspired by what he felt when he stood in front of nature looking and seeing in a quite primitive fashion unaffected by the dictates of inherited cultural codes. The vision is primitive because it is direct, it sees what is there to be seen not what the past teaches us to see.[154]

Like most of the modern architects discussed in this paper, Murcutt's architecture started out exploring the principles put forth by Mies and Le Corbusier – the minimal rectilinear 'objects in the landscape' that connected people to the landscape by removing them and elevating them above it, not integrating them with the natural elements. But soon, like the other Tropical Modernists, his architecture took a more place based, climatic, natural and regional approach to modernism. Since this turning point his work has continually explored the relationship between architecture and nature, man and nature, and what it means to design in Australia. As a summation of the chronology of Murcutt's career, his work is divided up into several different periods, starting in 1969 when Murcutt first went out on his own.

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[153] Philip Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form* (Sydney: The Law Book Company Limited, 1985), 12.

[154] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 39-40

> At the beginning, in 1969, Mies-inspired Modernism prevailed, loud and clear, as Murcutt's early work testified. From the mid-1970s, Miesian references were cross-fertilized with the forms and rationale of traditional Australian buildings: the Marie Short house at Kempsey represents a turning point where, in essence, the image of Mies's Farnsworth House meets the logic of the Australian woolshed. Then, as his preoccupations took him further back into his country's history, Murcutt discovered deep affinities with the Aborigines, their culture, their temporary bark shelters and their immemorial territorial knowledge of the island continent. This reference was added to the others; it refined them and, from the early 1980s, Murcutt was producing a series of lightweight buildings clad in corrugated iron, images of which were to make his name outside Australia. More recently, all these references have gradually been recast in a more complex, freer architectural language, where the spirit of Nordic Modernism, which so impressed Murcutt when he first visited Europe in the early 1960s, has resurfaces: the Boyd Art Centre at Riversdale could be seen as its masterpiece. And, in counterpoint to these architectural shifts, his career seems to have been led throughout by two guiding threads, two influences which cap all others and explain a good many of his ideas: the fundamental thinking he acquired from his father, to which he never ceases to refer, and his empathy with the nature and landscape of Australia, which also dates back to his childhood.[155]

Murcutt favors working alone and only takes jobs in Australia, despite having reached a bit of fame internationally. He enjoys smaller projects but his work has included several large projects including a few museums and visitor centers. He is most well-known for his rural farm houses that are lifted off of the landscape and stretch out rectilinearly, connecting with the Australian landscape, but he has also designed many houses in urban areas as well, connecting users with intimate gardens held within their walls and accomplishing the same environmental living aspects as his rural work. To Murcutt, the house is not just a 'machine for living', as laid out by Corbusier, but it is a climatic machine to connect people with nature. His interests in airplanes and sailing from his childhood appear in his work, but it is his critique of Australia's trees and Aboriginal culture that drive his architecture beyond the machine aesthetic and into harmonious buildings within their environments.

Comparison to Factors

Henry Seckel's factors for a regional architecture was critiquing architecture in Hawai'i, a place with no plethora of a single material, a forgiving climate, a diverse setting, and a land of many cultures and people. Murcutt has been able to find a regional architecture based on these factors of Australia. The material he uses is corrugated metal, stemming from vernacular rural woolsheds and Aborigine bark shelters. The climate in this subtropical region of Australia, which does vary with the seasons and Murcutt has found a way to passively connect people to nature while still giving them the necessary shelter. The rural settings of Murcutt's work exist in the horizontal expanses of the Australian outback and Murcutt has adapted his houses to each site in the same way trees of the same species adapt to different locations. Murcutt is not only inspired by the pioneer's vernacular buildings of rural Australia in his architecture, but also studies and engages with Aborigine culture and expresses their concepts and lifestyles in his

[155] Fromonot, *Glenn Murcutt: Buildings + Projects 1962-2003,* 18

architecture as well. But it is the 'environmental living,' as Seckel calls it, afforded by the tropics that creates the intimate connection between man and nature in Murcutt's architecture and makes a uniquely Australian form of Tropical Modernism.

Material

There is one material that Glenn Murcutt uses in his buildings above all else – that is corrugated metal. There are many practical reasons for his use of this material, its strength, economy, transportability, and workability, but it also resonates with the regional architecture of Australia as well. Used in not only the pioneer days of Australia for rural structures built for function and ease of construction, corrugated metal was also a favored material of contemporary Aborigines and was even common in the airplane construction of Murcutt's childhood as well. It is important then to understand that Murcutt's material choice is based on these two factors – function and resonance – and that they work hand in hand. The reasons why corrugated metal was so proliferate in Australian vernacular architecture are the very reasons why it is still a practical material to use. Murcutt does not use the material only for its cultural implications and not solely for its functional reasons either. He has this same relationship with many of the concepts in his architecture, not just material.

> It is very easy to misunderstand the importance of corrugated iron to Murcutt's architecture. It is not a gimmick or a cheap trick to attract notice. Rather it arises from his sense of the beauty and poetry in ordinary things and his desire to create building which speak to the people. His rediscovery of corrugated iron, Pillar Naco clip louvers, paten glazing bars, external venetian blinds, these are not end in themselves. Rather they are examples of sensible responses which have somehow been forgotten or ignored over time, and which, in their own way have not been bettered. But it addition to his resuscitation of earlier neglected materials and building components, Murcutt is intent on finding new products and in adapting existing components, using them in novel ways, to deal with the issue of the environment. These new elements share with the older vernacular materials, the same qualities of lightness, toughness and delicacy. So the two are always related.[156]

Fig. 106. Bain News Service, *Junker 6/31 Airplane*. 1927.

Fig. 107. Harry Sowden, *Australian Woolshed*. 1973.

[156] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 77

During Murcutt's childhood in New Guinea, as well as time in Australia, he was exposed to airplanes and spent time making model airplanes. This exposure and hobby not only influenced his climatic responses to aerodynamics and ventilation, but also inspired his use of corrugated metal.

> The lightweight aspect, the rounded aerodynamic roof profile and the preference for corrugated metal cladding in his buildings may well be the product of Glenn Murcutt's early exposure to aeroplanes such as the rugged Junker G/31 [Fig. 106] and W/34. The wings and fuselage of the Junkers were covered with small profile dualumin, the sheets, as one would expect, being fixed with the profile horizontal. Corrugated iron was used extensively in the Territory because its light weight, strength, and ease of transport made it the ideal colonial building material.[157]

The early woolsheds (Fig. 107) and other farm sheds in rural Australia were built of corrugated metal and were built economically to not only serve their functions but also survive the climate within minimal means. Because of the ease of the material, corrugated metal sheds are a common site in Australia and make up part of the vernacular language. Murcutt borrowed this language in his own architecture to give resonance to the vernacular, but also to capitalize on the common building techniques of the rural areas his houses were being built. As Françoise Fromonot discuss about Murcutt's use of vernacular building typology,

> As well as such 'borrowings', the strategy that Murcutt adopted towards construction was analogues to the logic that had engendered Australia's vernacular buildings, thereby reviving some of their forms. It is through this *analogous inspiration*, and its extension into the design of the whole buildings, that the corrugated iron shed and, more specifically, the woolshed, could be seen as having been the paradigm of his architecture for a while. If the woolshed belongs to the same generic building types as barns, its internal arrangement – dividing into stalls – reflects the work that it was built to accommodate. Its length corresponds to a given scale of wool production; its height is just sufficient to allow hot air to rise, so enabling the interior to be cooled by convection. The roof-pitch is calculated so that condensation will flow down the flutes of the soffit without dripping. The raised floor keeps the building clear of damp ground, ventilates the underside of the floor and provided shelter for the flock. When the woolshed consists of more than one range, these are joined along their length and linked at roof level by a box gutter corresponding in width to a sheet of iron. Rainwater is collected and stored in corrugated iron tanks set against the outside wall. From the outside, the woolshed appears blind, owing to its opaque, windowless enclosing walls. In fact, small gaps are left between the infill components – often roughly hewn tree trunks or planks – so that the intensity of outside daylight is reduced to tolerable levels within the building; and as the long side usually faces the prevailing wind, these stilts also allow through-breezes to ventilate the interior.

[157] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 13

> So these buildings are passively lit and ventilated by means inherent in their construction.[158]

The idea of buildings for functions or out of necessity and economy created this vernacular language and building type. But the functions and benefits of the building materials transcend their aesthetic associations and is used by Murcutt in the same ways as his original inspirations. Corrugated metal is only one of the connections between the Australian vernacular and Murcutt's reuse of common place architectural elements. His use of corrugated metal rainwater tanks on his rural farmhouse projects is another element that connects his work back to the rural vernacular (Fig. 108). His use of verandas from the vernacular, reimagined as an outdoor room, screened from insects also makes connections. Cedar external storm blinds, glass jalousies, lattice screens and corrugated metal ceilings are all also elements that Murcutt reuse that connect his work back to the vernacular. These are all tried and true solutions for the region given its resources and climate, Murcutt seeks to only incorporate and improve on the vernacular rather than reinvent or assume that he knows better. His use of them is based on their years of practice and effectiveness in houses already built. They were first use for their functionality, Murcutt uses them for the same reason, but in this usage it connects him back to a regional vocabulary.[159]

Murcutt's use of corrugated iron revitalized the Australian architecture community's appreciation and use of the material as a way to reconnect with the vernacular structures of their country. By using it however, not just for its aesthetic appearance and cultural response, but also capitalizing on the material's structural qualities he has been able to authentically use the vernacular material.

> Corrugated iron has become one of Murcutt's favorite materials for the same reasons, which differ very little from those that made its use so widespread in the Australia of the pioneers. Supple, strong, adaptable and available everywhere, it is very economical both in price and because, being lightweight, it does not require hefty supporting structures. Easy to stack and transport, it makes an excellent cladding material. And, just as it provided a means to exploit an immense continent devoid of infrastructure for agricultural purposes during the colonial era, it now lends itself admirably to the construction of second homes on sought-after and often remote sites for city dwellers wishing to get back to Nature and experience life in the bush. Corrugated iron has long been fashioned into cylindrical rainwater storage tanks to serve remote farmsteads and, as farmers continue to make them, the necessary equipment is to be found in every village – exactly the same cylindrical tanks are used by Murcutt for his houses. Even if the use of corrugated iron, so omnipresent in Australia, had begun to whet architectural appetites some while back, Murcutt was the first Australian architect of his generation to use it as cladding for an entire house (the Ball-Eastaway House[Fig. 109]) and for a public museum (the one at Kempsey). By doing so, he raised the status of this commonplace, cheap

[158] Fromonot, *Glenn Murcutt: Buildings + Projects 1962-2003,* 33
[159] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 77

material and hastened its adoption for 'highbrow' architecture from the 1980s onwards.[160]

Fig. 108. Glenn Murcutt, *Marie Short House*. 1974, Kempsey, New South Wales, Australia.

Fig. 109. Glenn Murcutt, Ball-Eastaway House. 1980-83, Glenorie, Sydney, Australia.

Corrugated metal also has a connection to Aborigine shelters. The Aborigines used bark in large sheets that were bent and shaped to create a protective shelter from sun and rain. The corrugated metal has many common characteristics to this use of bark, where left over a rod under its own weight will curve into protective forms. As Philip Drew explains,

> Aborigines prefer corrugated iron above all other materials for building and have resisted well-meaning attempts to introduce more costly, and therefore more acceptable materials. There are probably many reasons for this but one factor deserves to be mentioned; in their traditional shelters the Aborigines used bark in large sheets which were bent or shaped as required to form the shelter. And although corrugated iron is superior to bark in nearly every respect except thermal insulation, it is very similar to bark in its uses and form. It was therefore natural for the Aborigines to adopt corrugated iron as an improved type of bark – as a man-made bark.[161]

Climate

To Glenn Murcutt, the house is a tool or a lens that connects people with their environment while maintaining a comfortable protected sanctuary for them as well. His background with airplanes and sailing has connected him mechanically to the forces of nature and how with design, man can overcome, work with, or incorporate aspects of the climate. His houses are well tuned tools that can let aspects of the wind, sun and weather to move around, over and through the house at different times depending on the climate and the comfort of the inhabitants. In this connection with the climate, people who live in Murcutt buildings are aware of the weather constantly, and this connection helps create a better harmony between nature and man. This connection is obtained through several different devices, systems, and design solutions created and observed by Murcutt. As Murcutt explains himself,

[160] Fromonot, *Glenn Murcutt: Buildings + Projects 1962-2003,* 33
[161] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 64

> Similarly, planning and locating buildings to let in or to exclude the sun, to catch the breeze and exclude the rain, so that a person may enjoy the weather, and enjoy the knowledge of whether it is a fine day, a windy day, a wet day, or, a cold day. To be aware of the quality of the day and at the same time, to be protected from the elements. To experience with the house whether it is a hot day and to be able to respond by allowing cool air to pass through the walls. The house must be a filter between man and the outside. Those things are very important to me.[162]

The way that Murcutt connects 'man and the outside' is in a way that is different than the typical, western influenced building in Australia. His connections to the climate in his architecture are more closely related to primitive huts and were more in tune with tropical concepts of shelter. Open walls, or operable walls was a major necessity for this connection and was a tipping point for Murcutt's architecture.

> One conclusion, more than the others, was of signal importance, and this was the realization that anything less than a fully opening wall was inadequate in such a climate – the wall was to be treated as a diaphragm filtering the outside rather than a barrier to it. The new conception of the house as a lightweight pavilion lifted up off the ground and open along the sides was more closely related to a Pacific Island hut or tent than the Regency house of early colonial Australia.[163]

The opening wall was an important design solution for dealing with natural ventilation in his Australian tropical homes, but Murcutt also dealt with wind and ventilation in other ways deriving from his knowledge of airplanes. Aerodynamic shapes and profiles in his architecture are developed to deal with the wind patterns on the site in different ways. Depending on the site and intensity of the wind patterns, Murcutt has created tested solutions for either blocking or increasing airflow through a building. Because Australia has different season and can get colder in the winter than most other buildings of the tropics, Murcutt also seeks to find out the seasonal wind patterns as well, so that cooler breezes can be allowed in during the summer months, but mitigated in the winter months.

Murcutt achieves this by following principles of aerodynamics found in the wing section of airplanes. His long roofed pavilions go perpendicular to the direction of the breeze and the walls are operable to modulate the breeze that enters through the house. The ridge profile is also rounded at the top like an airplane wing so that it doesn't catch the wind, instead allows air to pass right over it. A small gap that runs the length of the roof on either side allows air to be sucked in and drawn out the other side, evacuating hot air collected in the interior during the summer.[164]

This knowledge of aerodynamics and airplanes started from his childhood in New Guinea and continued into forms for his architecture. His uncle, Raymond Powys, was a flying instructor and pilot and had a big influence on Murcutt in his early years. This interest in aircraft was

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[162] Murcutt, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 64
[163] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 84
[164] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 68

manifested in his gliders and model airplane building as a child. This led him to understanding how airflow traveled over the profile of the wing. His later architecture work started incorporating curved roof edges and he began experimenting with the streamlining of his designs. As Drew explains,

> It is fair to say that the round aerofoil shape of the roof is due, in part at least, to his appreciation of air flow behavior and is an outcome of his interest in aircraft design. But it is a little more complex, even than that. Such a relatively streamlined shape involves the elimination of discontinues in a surface, so the wind can be seen as a factor which is used to justify continuity of surface and the achievement of a certain harmony of profile in the shaping of the building form. The curved ridge sheet is fixed on top the reaching sheet.[165]

As Murcutt explains,

> The ventilation gap substantiated the thinness of the roof. By so introducing the ventilation I achieved an aerofoil section so that the wind on the leading roof slope is under an increased pressure while on the opposite side, the pressure is reduced, this has the effect of reducing eddies, and, in addition, cools the roof space by constantly clearing the air. Therefore, there isn't the same build-up of heat which is later re-radiated through the ceiling into the living spaces.[166]

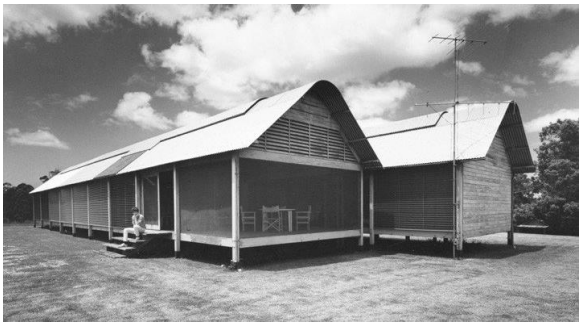

Fig. 110. Glenn Murcutt, *Kempsey Farmhouse*. 1975, Kempsey, New South Wales.

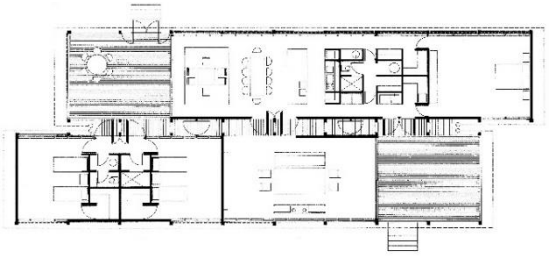

Fig. 111. Glenn Murcutt, *Marie Short House Floor Plan*. 1974, Kempsey, New South Wales.

Murcutt's Marie Short farmhouse, Crescent Head, 1974-75 (Fig. 110-Fig. 111), was one of the first buildings he designed that so expressly represented his vernacular-woolshed inspired, Miesian pavilion, that was a climatic machine that could be tuned and adjusted to accommodate for the changing climate of the site. When he began designing the farmhouse, he looked to his design philosophy that buildings in Australia should be like trees of Australia. Each species not only is adapted to certain climatic conditions of the island continent, but also each one adapts to the various micro climates of their site. A tree changes its grasp of the earth and height if wind conditions are more sever, and they grow differently in wet conditions differently than dry conditions. For the Marie Short house, he looked to the trees of the area for inspiration on how to adapt to the site's climate. The mulberry trees on the site provided a warm space in the

[165] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 68-69
[166] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 68-69

winter and a cool space in the summer under its canopy, and the effectiveness of the design was then measured by the metric of the mulberry.[167]

To create a passively designed house that didn't rely on mechanical heating or cooling to offset the conditions of the outside temperature, Murcutt had to study the site and come up with different devices to adapt to changing temperatures. The intention for Murcutt was to not only create a comfortable shelter, but also to create a connection with the outside. He had to figure out ways on the Marie Short farmhouse to mediate heat and humidity, but also combat the cold winter winds while maintaining openness for cooling breezes in the summer. He wanted to do these without isolating the occupants from the weather, instead wanted to use the design of the house to connect them with the environment. The house was less of a refuge and more of a tool in which to observe the weather of the day. This was important is preserving the Australian "outwardness" of daily life.[168]

Fig. 112. Glenn Murcutt, *Marie Short House*. 1974, Kempsey, New South Wales, Australia.

Fig. 113. Glenn Murcutt, *Marie Short House*. 1974, Kempsey, New South Wales, Australia.

The building in essence is two elevated pavilion type structures that are long in the perpendicular direction to the wind to increase cross breezes and are connected by a central walkway that also serves as the roof gutter. The walls are primarily left open and only enclose the interior through the use of louvers and screens (Fig. 112). The glass louvers modulate wind flow into the house and the wood screen modulate daylighting. Murcutt realized that on a site like this, anything less than fully operable and open-able walls wouldn't work. In this area close to the coast the design needed to draw in cool breezes. He helped decrease the temperature of the incoming wind as well by planting areas of dense vegetation just below the winds, create pockets of cold air which the wind would blow through.[169] Murcutt uses similar climatic devices on his other buildings, and has evolved them to meet different climatic responses over the years. The weather vane like device at the top of the chimneys on the Marie Short House (Fig.

[167] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 82-83
[168] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 83-84
[169] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 70

113) is shaped to create a negatively pressured zone to help suck out the smoke from inside – while protecting it from rain. In other houses, he reuses this on the eve of his roofs to help ventilate out hot air that rises in the interior. The vane like shapes turn in the wind and through their shape create a venturi effect that speeds up the movement of air thought their openings.

Setting

Glenn Murcutt takes the setting of his work very seriously. His inspiration is the Australian landscape and he seeks to have the landscape reflected in the character of his structures. As Murcutt explains, "My architecture has attempted to convey something of the discrete character of elements in the Australian landscape, to offer my interpretation in built form."[170] He does this by creating and studying the setting of his houses, not only climatically but topographically and through its vegetation. The Australian landscape, in Murcutt's words, is "is remarkable. I have learned much from scrutinizing the land and its flora."[171] His studies of the flora started in his childhood with his father, Arthur. As Murcutt tells the story of his father teaching him about the trees of Australia,

> I remember going up the hillside at Clontarf and looking at *Casuarinas*. We looked at the *Casuarinas* near the water's edge, half way up, and at the top of the hill. And what we found was quite remarkable. We then repeated the exercise with *Acacias*. My father showed me that the *Acacia* at the top of the hill was a smaller version of the same species at the bottom of the hill, but he explained that the plant at the top of the hill was subject to a higher wind velocity and rainfall, but that there was increased runoff. The ground was subjected to more extreme erosion, so there was less moisture in the soil to sustain the growth of a larger tree. All these factors: the leached soil, dryness, hardness and wind exposure produced a plant whose form varied according to location, but it was, nevertheless, the same tree we were looking at.
>
> My father taught me that plants responded to their particular environment and that was an important lesson which I later applied to the design of houses.[172]

This lesson of how trees adapt to their environment learned from Murcutt's father can be seen in his approach to designing houses. Murcutt is known for one type of structure in particular, the long pavilion like structure, he adapts this type to different sites in different ways depending on the setting. As Drew explains how this philosophy learned from botany is applied to architecture as a place-based adaptation,

> If the house is considered as a type roughly equivalent to a species then it can be repeated over and over again. But each house is never the same as the previous one. The house form, like that of a species of plant, varies according to the requirements of the client and the stresses imposed by the individual location. Plants, properly constructed, are a revealing indicator of site conditions. Their form is evidence of how they individually have adjusted to the forces acting on the site, which contribute towards the formation of a unique

[170] Murcutt, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 7
[171] Murcutt, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 7
[172] Murcutt, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 60

> character or spirit of place. A house such as the long Murcutt type, much as a species of plant, is only suited to a range or geographical environments. Beyond this, it is unable to be adapted. There are limits to the adjustments of the house type and its ability to meet extreme demands. These lessons from nature are fundamental to Glenn Murcutt's expression of architectural form. His houses, like the bush surrounding them, bear witness to the action of sun, wind, and rain.[173]

This adaptation of his dwellings to their site in response to the climatic conditions is to create a more comfortable living experience. In the rural houses of his work his pavilion buildings respond with horizontality, permeable facades, and roof shapes that either respond to the wind or to the sun. As a rule his buildings lift up, above the terrain to allow water runoff but more importantly create a separation between the house and the untouched nature of the site. In the urban work of Murcutt's, he still creates a response to the site based on climatic conditions – wind, sun, and rain – but in these sites he also has the opportunity to create the natural conditions. His integration of nature is not done in the same way as other Tropical Modernists that seek to find a balance with nature, or, in some cases, allowing nature to overpower the architecture. Murcutt's approach to this relationship is different. As Drew explains,

> In Murcutt architecture man is nearly always depicted as separate from and superior to nature, hardly ever is man envisaged as merging his personality with nature. The man-made and the natural are conceived of as separate entities. What is attempted in such architecture is to relate man and nature in a progressive hierarchy. In those contexts where nature has been affected by man the house is allowed to sink into the garden. But in the Australian bush, the house is lifted above the ground in order to establish a greater distance between the dwelling and nature. The Wunda Road house is one of Glenn Murcutt's most accomplished works. He orchestrated the architecture so it gradually slips into the garden as each of the horizontal decks step down and out from the house. It was not intended that architecture be assimilated by nature, nor was the relationship one of equality. Man maintains his distance. What was attempted in a most sensitive way, was to relate architecture and nature as participants in a spatial continuum, so that the interior of the house-pavilion reaches out into the garden.[174]

The outreaching horizontal pavilion that Murcutt creates on his rural sites responds to as he says the horizontal nature of Australia. Like Frank Lloyd Wright's houses would be low lying structures with an emphasis on the horizontal line through brick and window proportions, Murcutt's buildings respond with overall building proportion and the horizontal line defined by the multiple layers of screens, louvers, and façade devices. As Murcutt explains where his horizontal inspiration comes from,

> What is clear is the horizontality, and it is a force which is not much in evidence in our buildings generally. It is something that I feel I need to respond to by producing buildings which are of a linear nature. More than that even, I wish to

[173] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 14-15
[174] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 26-27

> look at the larger question of horizontality and seek ways of giving buildings horizontality of form . . . Other than that, my buildings follow the contours . . . I follow the contours because the contours are – by definition – horizontal lines. Now, I first of all have to make my building work with the contours. Next, it has to relate to the sunlight, and if I can do this with the contours and with the sunlight in unison then I have made a good start.[175]

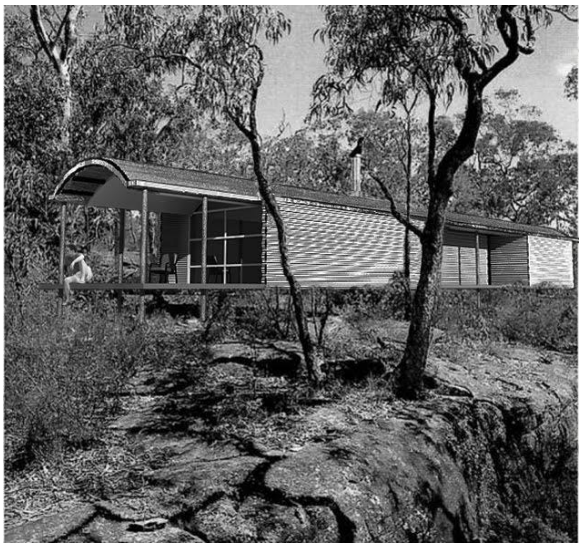

Fig. 114. Glenn Murcutt, *Ball-Eastaway House*. 1980-83, Glenorie, Sydney, Australia.

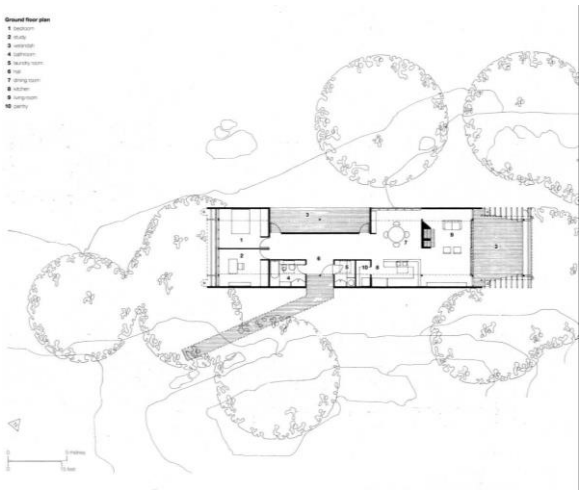

Fig. 115. Glenn Murcutt, Ball-Eastaway House, Floor Plan. 1980-83, Glenorie, Sydney, Australia.

Glenn Murcutt's Ball-Eastaway House was built on a forested sloped site with uneven terrain (Fig. 114). Murcutt uses his typical long pavilion type structure and places length wise along the slope but accommodates for sun protection by creating outdoor verandah spaces on the northern side of the house. He also uses his curved corrugated roof type here to help with the aerodynamics of the building to increase airflow around and through the building. But the orthogonal layout of the building, Murcutt says, was inspired by the landforms of the site,

> I observed a series of plateau or rock ledges, on inspection I noticed them all moving into one another. There was a series of benches – three in all – moving through the landscape. The first shelf divided under the house and followed through to emerge below the entrance. As the rock ledges peel off, I've strengthened the suggestion in the building by introducing the verandah. The walls of the house are themselves placed parallel with the rock shelves. Thus, the house develops a linear character because the site is itself linear.[176]

Murcutt spends a long time on his sites before he builds on them, studying not only factors about them that inform the mechanisms of his buildings – sun direction, air flow, and temperature – but also studies the character of the site as well. The Kempsey Farmhouse, also known as the Marie Short House, was originally built for Marie Short in 1974-75, but Murcutt eventually bought the house from the owner and added on an extra structural bay to each

[175] Murcutt, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 58
[176] Murcutt, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 58

pavilion for himself. He now uses the building for himself and has since increased his whereabouts of the site.

> I know where I am because of what is here, there is the high rainfall, and the lushness of the vegetation. Something that you have to get used to here is having water under your feet – and you do have to get used to it! Not only that, you must start to love it, to love walking around in the water. One thing that you can do which is beautiful is to lift the house up off the ground so that the water is no longer in it, but is around the feet of the building instead. This is an aspect of this place.
>
> And because we are in a watershed area which experiences a high rainfall – a low swampy country – you find Melaleucas, Swamp Oak, Swamp Eucalypt, Flooded Gum, Swamp Mahogany. Once you move on to higher ground these are replaces by Casuarianas, Tallow-woods, Brush Box, and Scribbly gums – and many other species.
>
> I know where I am because of the temperature, the humidity, the trees, the wind, and the flow of the Maria River. I know where the Melaleucas stand, and where they fall into the river, I know the Murray Lilies and the reeds. It is important here to know the north-east winds, so as to be exposed to the perfume from the water lilies and the honey from the Melaleucas. So I know where I am. For me to locate a building, it must be related to all of these and many other things besides.[177]

Culture

Culture plays a very important role in Glenn Murcutt's work, but at the same time a very subversive one. His houses aren't overtly reproductions or expressions of cultural building types, though they do have some resonance with vernacular industrial building types. They are not the expressively styled houses of Oscar Niemeyer whose buildings read as unmistakably Brazilian with their flamboyant curves. Murcutt's houses and architecture represent the concept of the Aborigine or New Guinean hut, and the form of the Australian woolshed, but the cultural aspect comes through in its relationships to nature. Murcutt's first culture was from his childhood in New Guinea. This was impactful in the way that he conceptualized a home, and the houses that he grew up in left a lasting impression on his architecture. As Drew explains, there are commonalities between the tropical home of the Murcutt's in New Guinea, and Murcutt's later work.

> The striking combination of primitive and cultivated or refined qualities in the same building is something which, it can be argued, Glenn Murcutt inherited from his New Guinea childhood. The Murcutt family lived in a timber house on the Upper Watut. It was elevated one story on posts, and had a low pitched corrugated iron roof. On the long side, the wall was open above the balustrade, the long horizontal opening being protected by louvered shutters. Nearby were the huts for the indentured laborers. These were long simple huts with steeply pitched saddle back roofs of kunai grass thatch. The huts were built directly on the ground and varied according to the origin of the New Guineans. Arthur Murcutt was an indefatigable builder of houses, in New Guinea, and later on, in

[177] Murcutt*, Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 50

> Australia. His Australian buildings repeated many of the features of the New Guinea houses. It is easy to see why Mies van der Rohe's Farnsworth house should have excited his interest when it was published in 1951. It too was raised up off the ground, and was intended to take in nature.
>
> The New Guinea long house is a type which is encountered throughout the Pacific region; it is typified by a narrow rectangular plan and powerful saddle back thatch roof supported on posts and open under eaves. The archetypal Murcutt house in the 1970s is remarkably similar in its form, except that it is raised above the ground. On the coast, and, as requirements for defense dictated, New Guinea huts were lifted on stilts. The question of whether the long house served as the paradigm for the houses after Kempsey must rest unanswered, except to note an all too obvious resemblance between the two types. It is also worth recording that the long house type is a very sensible, rational way to build.
>
> Rain falling in great luminous droplets every afternoon, the steady reassuring drum beat of rain on the iron roof, the ground water-logged, wet underfoot, water gushing down the flume at the mine site; water, in all it variety, was an inescapable accompaniment to life in New Guinea. A child's delight in the liquidity of water, collected, channeled, swirling, is a source of form in Murcutt buildings from the roof down to the ground.[178]

This cultural impact on Murcutt's childhood connected him with nature and gave him an understanding of how to build in response to nature using minimal means. It also helped shape his early conception of a house, one that was a refuge from the rain and provided shade from the sun. Its relationship with nature was one that was both through separation and observation. The houses of Murcutt's childhood and later work both elevate themselves off of the damp ground, and open themselves to the surrounding breezes. Later in Murcutt's life he began to study Aborigine culture, both working for them as his clients and living with them to experience their way of life. The relationship with nature that Murcutt had already come to understand in the rainy areas of New Guinea, was also translatable to the Aborigine culture as well. As Murcutt learned about Aborigine ways, he realized that his thoughts and concepts for architecture were quite in line with their understanding of nature. As Murcutt says, "To learn only last year that there is a saying amongst Aboriginals 'One most touch-this-earth-lightly,' was exciting and entirely consistent with my own perceptions."[179]

This relationship with nature can been seen in the placement and interaction between architecture and nature. His buildings stand on tip-toe above the ground plain as if anticipating a flood. Floating above the earth they do not try to battle with the setting and topography, but instead only nest in what little footings are necessary to stand up. The designs appear light weight and though man made in aesthetics harmonize with the site through its orientation, placement, and most importantly, respect to the ground, vegetation and nature of the area.[180]

It is this tip-toe relationship that Murcutt creates with his architecture that respond to Aborigine culture, but it is also his understanding of the site that resonates as well. Aborigine culture has

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[178] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 13-14
[179] Murcutt*, Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 8
[180] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 54

stories associated with sites, in much the same ways that Hawaiian culture does. These stories are a way to perpetuate the understanding and lessons learned about a place. Murcutt doesn't make an attempt to learn these stories, but does make the attempt to learn the lessons and gain the understanding of a place.

> Glenn Murcutt is mostly unaware of whatever Aboriginal legends may have been connected with particular sites but he is able to read the land and to respond to its peculiar character in a poetic way. So he does rediscover the character or genius of the places where he has to build.[181]

This place based understanding of Aborigine culture is directly relatable to Tropical Modernism and the architecture of Glenn Murcutt. As Tropical Modernism is a place-based modernism, a form of critical regionalism, the understanding and relationship with a place passed on by Aborigine culture can be directly related to creating this type of architecture.

> The land was for the Aborigine full of meaning. They were familiar with everything within it. Their sense of the land and their occupation of it can serve as a model for architecture, for when we think in terms of regionalism, whether we call it critical regionalism or selective regionalism, aren't we in effect asking that architecture be associated with territories in much the same manner as the Aboriginal absorption by specific sites and tracks?[182]

Murcutt understood that there were many lessons to be learned from Aborigine culture that could help to inform decisions in his architecture. Murcutt seeks to create architecture unique to Australia, its landscape and its way of life. Murcutt understood that the culture and architecture of the Aborigine was not only the indigenous culture, but was unique to Australia. From 1983 onward, Murcutt spent more time researching and learning more about Aborigine customs and traditions. He was intrigued by the ways many of the communities had learned to find a symbiosis with the harsh environments of the Australian bush.

> Murcutt envies the profoundly ontological, symbolic character of Aboriginal shelters made from bark and branches, which are at one with their immediate surroundings and imply minimal architectural input. The way he sees it, the culture emanates directly from the place where it is expressed. [183]

His findings seemed at first to only dovetail with concepts he already was practicing. The ideas of touching the earth lightly and creating homes within minimal means was something he had already been doing with his pavilions raised on stilts and of modest materials. The idea that his dwellings were temporary, and left little footprint on the earth not only in terms of footings, but also in terms of resources needed for construction, matched up with Aborigine concepts.

Environmental Living

'Environmental Living' is the relationship between man and nature in the tropics that make it a unique factor to tropical regional architecture. Environmental living can be seen expressed in

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[181] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 55
[182] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 55
[183] Fromonot, *Glenn Murcutt: Buildings + Projects 1962-2003,* 39-40

architecture in the form of verandahs, lanais and porches. In Murcutt's work it can be seen in the wall-less room. The majority of his buildings have fully operable and opening walls to allow passive ventilation and respond to the climate. This opening wall technique by Murcutt also has an effect on the lifestyle of the users as well, not just a climatic effect. In effect, the users can be outdoors, experience the breezes and the smells of the nature around them, see the views and see the vegetation – while still being sheltered by the main roof. Murcutt saw this wall-less room in the work of Mies – where Mies had created interstitial rooms that were as much a part of the main composition while giving this degree of openness. This is a different technique from common architecture with outdoor living space, which can be seen as an addition to the main structure and not an integral aspect. In Mies's Farnsworth house, this porch space can be seen (Fig. 4), and is described by Drew as follows:

> Mies distinguished the porch from the main enclosed space but leaving it open on three sides. Otherwise, it has a floor and roof and is included in the principal volume of the house. The spatial definition of the open room was strengthened by the extension of main roof out above the floor deck. There is an important different between such a portico and a verandah. Not only is it a real room which can be equipped with furniture, it is also effectively related to the other main spaces of the house, not as an afterthought or last minute addition to the house, but as an integral part of the house itself. That is really important. Such a wall-less room can be related to and serve as an extension of the main living space. A room roughly square in proportion which functions as a room should, made its first appearance in some of the schemes for the architect's mother's house. In one of the sketches, two outdoor rooms were designated, one off Daphne Murcutt's bedroom and another off the living room. The plain anticipated a similar plan arrangement for the Henric Nicholas farmhouse.[184]

This open wall-less room was an easy tool to use in the rural houses of Murcutt's work. The expansive views, the vast landscape and the openness of the site allowed for a house to open up to the environment, giving users the connection to nature that Murcutt saw was needed for his homes. But the wall-less room had to be rethought in the suburban and urban projects of Murcutt. The openness afforded by rural sites would not work in the same way where a neighbor was less than twenty feet away, but Murcutt found ways to still create this connection between indoor living spaces and out. In the house that he designed for his brother, Douglas Murcutt, in the suburb of Northern Sydney (1969-72), Glenn Murcutt created an intimate connection with the garden for each room of the house. As can be seen in the plan (Fig. 116), the house is still a long-linear building, typical of Murcutt's work, despite the site being trapezoidal in shape. What this relationship between site and building shape afforded Murcutt was a design that got larger towards the back of the site where the program became more private. This meant that these spaces could both be naked and private at the same time. On the public, northern side of the house, Murcutt uses a Japanese type of spatial transition between indoors and out. As Drew explains, it works like the Japanese *hisashi* space of the traditional Japanese house.[185]

[184] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 28
[185] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 31

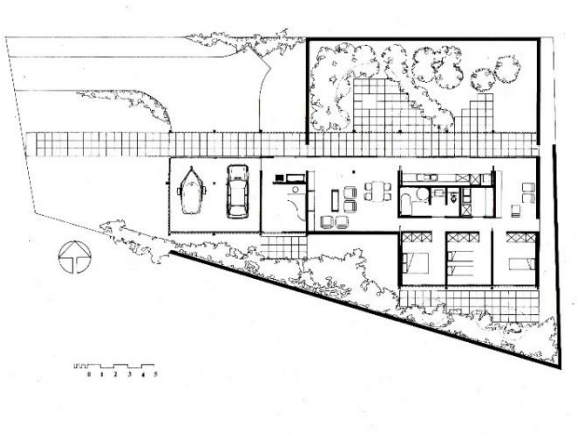


Fig. 116. Glenn Murcutt, *Douglas Murcutt House, plan*. 1969-72, Belrose, Sydney, Australia.

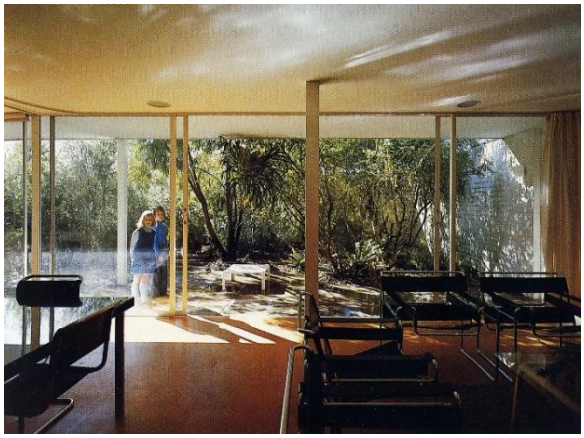


Fig. 117. Glenn Murcutt, *Douglas Murcutt House, interior*. 1969-72, Belrose, Sydney, Australia.

The Douglas Murcutt house uses many other tricks for continuing the space of the interior out into the exterior. The floor to ceiling sliding glass doors open up the house physically with the outdoors, but the concrete patio being at the same plane as the interior floor connects the space visually, even when doors are closed (Fig. 117). Also walls that continue from house to site help define the space as one unifying composition. The Douglas Murcutt house is a suburban example of Glenn Murcutt's philosophies about architecture and nature that can readily be seen in his rural houses. This philosophy is about connecting architecture and nature for the health of its inhabitants and for the poetics of place. According to Fromonot:

> … Murcutt's fundamental preoccupation… is his passion for the natural world and the Australian landscape. He has learnt to understand the laws of nature and landscape by observing their manifestations. As he sees it, architecture should neither oppose nature nor prevent its occupants from enjoying the landscape; it should reveal the environment to them and enable them to live in it. This he seeks to do by rendering perceptible phenomena at work on a site and by translating physical and visual properties – lighting levels, winds, sounds, colors and even smells (as the Broken Hill museum) – so that buildings, indispensable to human life, do not intervene between occupant and environment: a squeaky clean concept of ecology (Murcutt likes to describe his buildings as 'healthy'), combined with a desire to highlight the 'poetics of space'.[186]

Comparison to Modernism

Glenn Murcutt from an early age was inspired by the forms of Modern architecture from when his father made him analyze the Farnsworth House by Mies van der Rohe in articles in *Architectural Record*. From this, his early work could be seen as very Miesian and as explorations in the glass pavilion type set forth by Mies. The glass pavilion however had flaws that Murcutt would later discover and didn't climatically respond well to the harsh sun of Australia. In his early work however, the High Modern influence was never more apparent. According to Drew:

> Running through all the early work of this period was an attachment to the glass pavilion. It is the one archetype in his architecture that he had repeatedly

[186] Fromonot, *Glenn Murcutt: Buildings + Projects 1962-2003,* 47

> returned to. Sometimes the expression is Miesian. At other times it seems that the image of the Farnsworth house has been replaced by Philip Johnson's glass house, and still later, the archetype assumes a Corbusian guise. Once established in his architecture, the glass pavilion was transformed, when the time came, into the long corrugated iron roofed hut type of his later houses. The glass pavilion is the generic type of Glenn Murcutt's architecture.[187]

When Murcutt saw that the glass pavilion didn't respond to the climate well, he saw to change it and render it in humble materials and elements that responded to both environment and character of Australia.

> Glenn Murcutt took the Latin text of Mies van der Rohe's architecture and freely rendered it in the vernacular. The steel and glass pavilion of High Modern became, in Glenn Murcutt's hands, an elongated corrugated iron shed, in effect, a Miesian hut. The translation of the glass pavilion into the Australian vernacular involved a great deal more than the substitution of materials, it involved a shift from high style towards a more primitive expression and was accompanied by a closer identification with nature.[188]

There were other influences of modern architects accredited to Murcutt's work other than Mies. In Murcutt's various travels he came encountered with various European and American architects and architecture that through his own interpretations inspired his work in different ways. When Murcutt went to Europe he visited Pierre Chareau's Maison de Verre in Paris (Fig. 118). This home was influential on Murcutt in the way it took industrial and manufactured elements and altered them to better suit a need or give them a crafted appearance. Many different elements in the Masion de Verre were fabricated to be operable and gave a machine like aesthetic and ability to the house. "The precedent set by Chareau certainly fostered his evolution towards an overall concept of the house as a *climatic machine*."[189] Murcutt was also a great fan of the work by Alvar Aalto. Murcutt is a collector of his furniture and often furnishes his houses with Aalto chairs and tables. He visited several buildings of Aalto's and saw that they were uniquely Finnish because of their relationship with Finnish nature. Remove the nature from the architecture and it wouldn't have the same character. Murcutt applied this to his own work and also saw Aalto's furniture as responding well to Australian character in their lightweight and humble aesthetic.

Murcutt also was influenced by architects of his own generation and country as well. He has a long standing relationship with architect and colleague Richard Leplastrier. Leplastrier's work is another example of lightweight climatic buildings that seek to invite the environment inside. He too creates single room houses representing the minimal hut that can be traced back to both Japanese and Aborigine concepts of architecture inhabiting the landscape. Leplastrier worked for Jørn Utzon in Sydney for a few years and also studied and worked in Japan for over two years in the late 1960's. Murcutt and Leplastrier taught together at the University of Sydney in the mid-1970s. This was during a time when Murcutt was building the Marie Short Farm House and

[187] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 25
[188] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 43
[189] Fromonot, *Glenn Murcutt: Buildings + Projects 1962-2003,* 42

Leplastrier was building his Palm House (Fig. 119) bordering one of Sydney's northern beaches – and they visited each other's sites.[190]

Fig. 118. Pierre Chareau, *Maison de Verre*. 1928-31, Paris, France. Data from: University of California, San Diego.

Fig. 119. Richard Leplastrier, *Palm Garden House*. 1974-76, Sydney, Australia. Photographer: Michael Wee.

Glenn Murcutt went towards the modern aesthetic with his architecture in opposition to the current trends in Australian architecture at the time. In the 1960s, Romanticism was the regional style of Sydney's architecture. Murcutt maintained a modern architecture order and aesthetic for much of his early phase. It wasn't until later when other influences in his life made him turn to expand upon modernism and create a contemporary architecture that was unique in responses to Australian lifestyle and environment.[191] His realization that to make his architecture uniquely Australian didn't rely on just how his architecture wound up looking, but how it preformed, how it function and the relationships it created, changes how he interpreted modern architecture in his work. Modernism for him then was a way of expressing these relationships rather than hiding them or romanticizing them. This was based on his realization that the architect was an inventor, not an artist. This change in mentality made his work's primary focus on function and climatic solution rather than aesthetics and style. The nature of the Australian landscape became his paradigm for the order of his architecture.[192]

This was an important turning point in Murcutt's career as he no longer was trying to make aesthetically modern buildings with regional character, but actual functional regional buildings with modern understandings. He was seeking to create architecture that first and foremost responded to climate, environment, and the people living within. International Style Modernism didn't afford him this opportunity so he had to change his approach. This realization came from

[190] Fromonot, *Glenn Murcutt: Buildings + Projects 1962-2003,* 42-43
[191] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 39
[192] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 39

his trip to California where he visited modern houses there and was introduced to Craig Ellwood. Drew describes this encounter as follows:

> The turning point came when Glenn Murcutt asked Ellwood what he did to insulate the roofs of his buildings, to which Ellwood replied, "Why we air-condition them." This, in Glenn Murcutt's eyes was tantamount to an admission that there was something fundamentally wrong with all such buildings, the more so because America was then in the midst of an energy crisis. Afterwards, he felt impelled to develop forms of construction which avoided the need for air-conditioning. Construction which shaded and ventilated, and thus protected the interior of a house naturally. He was inspired to design an intelligent house which was lit, ventilated, and kept warm or cool, depending on the season, without relying on energy expensive technology.[193]

Murcutt changed the way he designed after this realization and tried to create an architecture that was both sustainable and passive in its resource use, but in doing so also responded to the place. Murcutt's architecture branched away from the main stream modernism and went into a primitive, in some ways, direction that took a deep understanding of a site and its conditions and translated it into shelter and experience. Murcutt's reinterpretation of both modernism and Australian vernacular created a unique typology in accordance with other forms of Tropical Modernism. His work earned him the Pritzker prize, the only Australian to do so, and he continues to create respectful architectural manifestations of the country he lives in.

[193] Drew, *Leaves of Iron: Glenn Murcutt: Pioneer of Australian Architectural Form,* 40

Design Language

The main purpose of this thesis project is to extract a design language from the previous researched architects' work in the tropics as to create a methodology to use when designing modern residential architecture in this region. This section of the project will look at the research and break down the work into elements of a language. First, what is a design language – what this means in terms of architecture. Then, what does a design language mean in the tropics? If a language is used to communicate, what needs to be said in the tropical region? The previous precedents studies are the basis for what has been said, from this we can find patterns and relationships and decipher a design language for the tropics. First, the work will be broken down into words, or a vocabulary. These words are architectural elements that help convey the conversation of the region. Words, or elements, like windows, doors, outdoor spaces, roofs, furniture, and others.

A language is more than its vocabulary however, it is also syntax and grammar. The order in which the elements are placed is the syntax of the design language. This is determined by what the message that one is trying to convey. The message, or the meaning, relate to those factors presented by Henry Seckel – context, material, economy, climate, setting, culture, and environmental living. Once there is an understanding of the words, the meaning, the order and how the design language of Tropical Modernism works, then one needs to learn how to speak it. The speaking, in this metaphor, is the methodology of the language represented in actual conversations. In the case of a design language, speaking is the architecture design.

So there will be vocabulary, syntax, and then language. The language is the methodology for design. Included in this discussion of design language for Tropical Modernism will also be another side research topic, undertaken during Practicum and attached as an appendix.[194] This side research, included, is a look into the syntax of Tropical Modernism as it relates to Hawai'i. This was important to call out in separate research as the tropical region referred to in Tropical Modernism is vast and large, with many peoples and architectures included under its umbrella. Language must change in response to its place and as the end result of this dissertation is two designs in Hawai'i, research on what the syntax of Hawai'i is, had to be done. All of this – design language, vocabulary, syntax, syntax of Hawai'i, and the language of Tropical Modernism – will yield in the methodology and theoretical framework for the residential design undertaken at the end of this project.

Design as Language

A design language usually refers to a certain commonality among elements and composition within a single structure or many structures. It is different than a style however – a style is purely the aesthetics. Design language is not only how something looks, but also its relationships. The relationships between an element, and a structure, to its context, if done in a particular way, could be derived as a design language. The relationship between the elements to another element could be derived as a design language as well.

Design, is constructed elements with thought to its order and construction. As an example one could take the design process of the facades of a building. During the process, an architect might say that they want the north façade of a building to read as the same language as the south, even though they are composed differently. The thought process to how a building will be built,

[194] See Appendix

composed, and read is the design process. The tool for which this is done is the design language. In the example, the building mentioned might be not a symmetrical design from east to west, so the north and south façades are composed differently. In order for there to be a harmonious composition from north to south, and the two sides to relate to each other, they need to 'speak the same language.' It is the relationship between face to face that is communicated. This design calls for a building with one language, where each relationship speaks to each other and the design is communicated effectively. When architecture does not speak the same language from façade to façade, this could either be by design, or it is a missed opportunity and causes a building to be inharmonious. The design language of the building, however, speaks for more than just the facades, but also the interior design and landscape design. Façade design language was just used here as an example.

In this metaphor for design as a language being taken quite literally, or analytically, words are architectural elements. In a spoken language, if one were to put a series of words together it doesn't mean that one is speaking that language. Not only do all of the words have to be of the same language, but there are certain orders in which words are placed. In a spoken language this is the syntax – or sentence structure. The structure changes depending on what one was trying to communicate. Language was invented to communicate from one person to another. In a design language, the architecture communicates from building to user. What does the building say to you? What do you, the designer of a building, want to say to people who see or use your building?

But after language was effective enough to be used to communicate, it began to be used creatively. Language can also be used to create poetry. Language can be made into an art form. Poetry can still be used to communicate, whether it is a message, a meaning, a story, or an understanding. The way that poetry communicates however is creatively, artistically, and filled with deeper meaning than just the face value of the given words. It is the order of certain words, more eloquent words, and certain structure, more illustrative structure. If a spoken language can be used to create poetry and art, so too can a design language. A design language can be used to communicate basic messages, like program, function, structure, and organization, but it can also be used to create poetic messages. Poetic messages like place, culture, environment, and relationship.

There are then many aspects of language as it relates to design. There is the meaning of words or elements, there is the order or structure for communication, there is the spoken sentence, and then there is the creation of poetry. Design language is of course vast and general, and like a spoken language changes from place to place, so does a design language change. Design language is even more in flux, not only does it change from region to region, but it changes from project to project. What we have learned from the architects previously studied is that each one of them have in a sense derived their own design language. Each house or manifestation of their design language is different as they are communicating different things. Each one communicates the relationship to site and climate differently. They may use the same words from project to project, but the way in which they order them is different. Saying one thing about site and climate doesn't necessarily mean that it will work in the same region on a different site – let alone on the site adjacent to it. But, there is a common vocabulary, and there are common sentence structures and meanings to the work discussed. This is not only because they are all in tropical climates and sites, but because they are trying to communicate similar things. They

communicate the relationship between man and nature, architecture and nature, and culture and nature. This is an important commonality for deriving a design language for the tropics.

Language of the Tropics

Origins

The areas researched when referring to Tropical Modern residential design do not just refer to all areas around the globe that lie within the tropical latitudes – there is another factor for filtration. This is the relationship between man and nature. It is hard to articulate briefly, but in the regions covered – Hawai'i, California, Florida, Brazil, Australia – and those areas also included but not covered as in depth – Japan, New Zealand, India, Vietnam, Mexico, Peru, Oceania, and the rest of Polynesia – there is a certain way in which man relates to nature. And when one looks at the languages spoken in these areas it can be seen. I am not attempting to turn the research into a linguistic analysis of the tropical regions, but in this metaphor for a regional design language it is interesting to also note the indigenous spoken language.

The majority of these areas speak languages of the Austronesian family. Austronesian is one of the largest language families, both in terms of languages included in it – which there are over a thousand – but also in terms of area of the globe covered, and population of speakers. It includes not only Polynesia – including Hawai'i, New Zealand, Samoa, and the islands of Oceania – but also Taiwan, the Philippines, as far west as Madagascar, and as far east as Easter Island. It went north to influence Japanese language, and went south to influence Aborigine language in Australia. It has origins in Vietnamese and languages of Southeast China, but its birthplace was in Taiwan. There are several interesting points about the Austronesian language as it relates to tropical design language, one was the migration patterns.

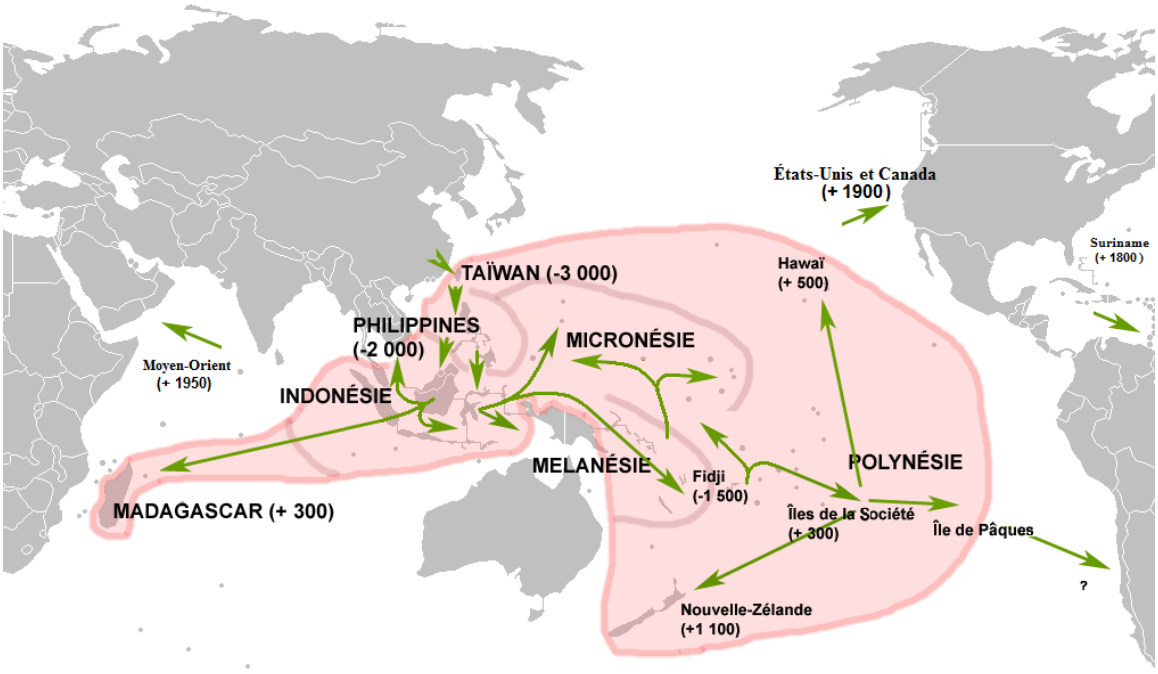


Fig. 120. *Map of expansion of Austronesian languages*. 2011.

The word Austronesian comes from the Latin word for southern and Greek word for island – literally meaning southern islands. It originated in Taiwan but then migrated to different areas of the Pacific in different waves of migrations over thousands of years (Fig. 120). The people of Austronesia are all coastal dwellers with a strong relationship to the ocean. They were sea faring people who navigated the Pacific and moved across an area of nearly half the globe. This fact of their migration history is interesting as it relates to the relationship between man and nature in the tropics. There is a strong bond between man and the water, due to the fact that their main mode of transportation was the ocean.

Language can be seen as one of the fixed manifestations of a culture – along with art, dance, music, religion, and architecture. The history of Austronesian language is that of one based around the water – already the language is defined by its place – meaning that the culture is based around the water and its location. The other interesting fact about Austronesian languages, for this metaphor of design language, is the sentence structure. In English, for example, a non-Austronesian language, one says "the boy pounded poi," putting the emphasis on the boy. In English, the boy is the subject and the task describes what he did. In Austronesian languages, the same sentence is structured as "the poi was pounded by the boy." In Austronesian languages, the task is the subject, who did it helps describe it. In effect, in both language families, the subject is all that is really important, and you could drop the second half of the sentence. In English, whose cultures are very much about the individual, one could have the sentence, "the boy." In Austronesian languages, where the subject is either the task or the place, the sentence could be "the poi." Through the language itself, you can already see the change in the importance in the culture. In English the subject and the importance is on the person, man, and the individual. In Austronesian culture, the subject and the importance is on the task, the object, and the place – the individual isn't even necessarily needed.

In essence then it is the context and place that is important in this region, not man. Cultures in the tropics then have this relationship between man and nature, where nature is the thing of subject, not man. That isn't to say that humans are subservient to nature in these cultures, or not important – there is great importance in genealogy and history of the individual. This is to say that in comparison to western or English speaking cultures, there is a great emphasis on nature, and the natural world and cultures are solely based around the individual.

Meaning

If you go to the tropics, you can see why. Austronesia is a region defined mostly by water and islands. Vast oceans for thousands of miles and lush vegetated islands, each one a paradise of flora and fauna. Indigenous cultures to the tropics understood this and therefore cultures whose genesis are of this region are very much place-based. There is a better understanding of the varieties to their environment than can be translated into English. Hawaiian language, for example, a member of the Austronesian language family, has many different words for the types of rain, currents, geography of a mountain, and varieties of wind.[195] Having names for all of these different aspects of their environment were essential not only in describing the place, but were essential in navigation, agriculture, and survival. The Austronesian languages therefore are manifestations of the place based cultures that live there.

[195] See Appendix

Tropical design language then reflects this aspect of the culture. Tropical Modern architecture is place-based design, where the subject is nature, not man. That is the overall arching theme that helps to define the regions termed “tropical” in this paper. Tropical not only refers to a climatic region of the globe, but also a cultural region where expressed in cultural manifestations, nature and place are the subject. It is interesting to see then how the different cultures of these regions, be them Austronesian or not, all have that commonality between them – a deep appreciation and understanding of the nature around them. By tracking how Austronesian language migrated throughout the Pacific, Asia, and Oceania, you can see how this influenced new cultures take on this understanding of nature as well.

Then thousands of years later when these cultures come back to these areas, this common cultural trait is still translatable through all languages. For example, it was theorized that though the origin of Austronesian language is in Taiwan and migrated south, but that part of it might have migrated north and might have influenced Japanese language to some degree. Fast forward thousands of years after all of the Pacific has been inhabited and each distinct type of language in the Austronesian family has appeared, and aspects of Japanese culture are still cross applicable to aspects of Austronesian cultures. Despite Japanese language growing into its own language, separate from Austronesian language, they still have cultural simulates. Both are island cultures with a deep understanding of nature and the ocean. In Hawai‘i, during the plantation days, many immigrant workers were brought over from the Philippines, China, and Japan. Their languages mixed with Hawaiian, Portuguese, and English created Pidgin – a language who shares the same sentence structure as Austronesian languages.

It is apparent then when you see much later when architects use influences from Japanese architecture in their work in the tropics that it almost seems better placed in this climate, than in Japan. But over the thousands of years that this language migration took place, each culture developed its own individuality and character, as well as language. So this makes it easier to distinguish what is Japanese, what is Maori, what is Hawaiian, what is Filipino, what is Australian and so forth. Because of this, there is now another layer of culture that goes beyond the common trait. If the common trait is the relationship between man and nature, it is the nuances of that relationship that gives the culture deeper individuality.

How this relates to Tropical Modern design language is in this way – the commonality throughout tropical design language is the relationship between man and nature, where nature is the subject, but the expression of this relationship is unique to each culture. Like how Hawaiian language has a different way of describing its environment or the nature around it than Japanese. Though these are both island cultures with deep understandings of their nature, they have different natures, different climates, and therefore have different ways of describing them. The way the design language is used then is first with the common trait – the relationship between man and nature – then with the expression of this trait as pertaining to its location. Because tropical refers to such a large area of the globe and many different cultures, it is important for tropical design language to not be based around just one of the cultures, but an understanding of each and when and where to use it appropriately.

Vocabulary

To start explaining why this study is important, I will use the following example. A common element of Tropical Modern residential architecture is the indoor/outdoor space – the outdoor room. Due to the benign climate of the tropics and the abundance of natural splendor, it is quite

common for people in this part of the world to enjoy spending their time in semi-enclosed spaces that are open to the elements. The tropics, despite its cooling breezes and warm temperature, is also a place of frequent rain storms and harsh sun exposure, it is necessary to shelter people of this area from both sun and rain while still allowing a connection to the outdoors and cool breezes. This element has many different names found throughout the different cultures and climates of the tropics. In English, this outdoor space is called a porch, veranda, or terrace. In Hawai'i, this space is called the *lanai*. In Japan, this type of space is called the *engawa*.

But, a Californian porch is different than the Hawaiian lanai or the Japanese engawa, but architecturally and physically they are quite similar. Usually they are extensions to the main house and are sheltered by low pitched roofs protruding off the side of the main roof. They represent the threshold space between indoors and out and are used both as a means of circulation between in and out, but also as a place of rest to observe outward from a covered area. This is the common trait for the tropics – the relationship between man and nature. But their cultural implications or meanings are deeper than this. The Californian porch tends to let in more sunlight and is used almost as a solarium. In other parts of the continental United States, the porch is a front-of-house space and is vital to the security and sanctuary of a neighborhood.

In Japan, the engawa space is functional for many reasons – namely to protect the *shoji* rice paper panels from the rain. A room in traditional Japanese houses is enclosed by sliding rice paper doors that can be opened up for a connection to the outdoors. The engawa wraps around the exterior of the room and provides circulation but also serves as a buffer from the elements. Another set of rain doors called *amado* protect the engawa space from the rain. Some water gets past the amado, but doesn't come in so far as to damage the shoji. The engawa then becomes the space between – which is an important element in Japanese architecture – in which during the dry months, people can sit at to look out at the manicured Japanese gardens. During the wet months, it is a protective space from the interior and the weather outside. The engawa is described as 'grey space' – not quite indoors and not quite outdoors.[196]

The traditional Hawaiian lanai, however, in its geneses was a building on its own. It was a simple post and beam structure with a thatched roof open on all four sides. As almost all activities of daily life happened outdoors in Hawai'i, the lanai structure offered temporary refuge from the sun and light rain. It differs from the Hawaiian *hale* in that the hale was typically a completely thatched structure on all sides including roof and walls. The lanai as a typology changed with colonization as westerners brought their own architecture and lifestyles and the lanai grew closer in relation to the American porch, attached to the main house. It wasn't until the time of Hawai'i modernist architect Vladimir Ossipoff that there was resurgence in the study of the lanai as a building typology in itself. Classified as a "non-building" it was an outdoor space that was suitable to the easygoing lifestyle of the islands. [197]

Syntax

This example goes to show that a single element of Tropical Modern residential architecture can have different implications culturally, climatically, and functionally based on place and user, but

[196] Edward S. Morse, *Japanese Homes and Their Surroundings* (New York: Dover Publications, Inc, 1961), 241-243.

[197] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 93

the common trait throughout is the relationship between man and nature. These elements are the words of the design language metaphor. There is also the order or structure for communication. In tropical design language, this relates the regional factors for design and essentially rely on what the message intended on conveying is. The regional factors for design were context, material, economy, climate, setting, culture, and environmental living. These factors translate into meanings and therefor sentence structures, or the syntax.

For example, if one were to design a residence in the Tropical Modern design language and wanted to communicate the climate, one would need to first know the climate of the site, then which words can be used to describe that climate, then know which order to put them in, in order to communicate the climate. An example could be extracted from the work of Glenn Murcutt for communicating climate. For his houses he first sets out to understand the microclimate of the site. Depending on the annual wind speeds and temperatures of the site, he can determine if he needs to make the house able to open up to the wind or brace itself to it. In some houses, he chooses to communicate that the summer heat is too unbearable so the house needs to be able to take in natural ventilation. That is his sentence meaning.

The words he uses are elements like a curved roof with a ridge vent, louvered walls, and sliding doors. Those words all have meanings to them too. The curved roof works like an airfoil so wind doesn't break against it and moves freely over the house decreasing eddies. The ridge vent allows the wind to pull out the hot interior air that has collected at the highest point of the roof during the day time. The louvered walls mean that the amount of wind and daylight let into the interior can be modulated depending on the comfort of the users. Sliding doors mean that there can be an uninterrupted connection with the outdoors, letting wind in when wanted, but also not letting wind in while still leaving an unobscured view of the environment around.

The sentence structure for how to order these words comes from his meaning. If his meaning is to make this house speak to the wind and the sun and natural ventilation, then it needs to accurately convey this. Murcutt does this by siting his houses longitudinally perpendicular to the wind flow. Because of his long pavilion type of residences, ventilation can easily flow from one side to the other. The curved roof is perpendicular to the wind, allowing the air to flow over with ease, while pulling out hot air from the ridge vent. Louvered walls are place on the windward side and sliding glass doors on the leeward side. This creates a venturi effect by breaking down the wind on the windward side and increasing its velocity through the house.

In this example from Murcutt's work, it can be said that he uses the Tropical Modern design language appropriately as he not only uses the words of the language, but also orders them in the correct manner as to convey that this house, in this site, needs to passively cool itself with natural ventilation from this direction.

This breakdown of the design language can be applied to other factors using other examples as well. It is also interesting how some words have more than one meaning as well. For example, in the work of Vladimir Ossipoff and the factor of culture, some of his words not only work for culture, but work well for climate as well. In some of Ossipoff's residences he might use a wood lattice motif on the façade that has references to Chinese architecture and culture. Behind this he places sliding shoji panels which are from Japanese architecture and culture. Beneath this, he places sill louvers, which reference the Hawaiian vernacular architecture. All these three elements together work harmoniously in conveying a house with Asian and Hawai'i cultural

references. It also works well climatically. The wood lattice works as a brise solei, shading the façade from too much sunlight. The shoji panels work to filter the sun light as well as modulate the wind flow into the house. The sill louvers do similar, where even if the shoji panels are closed for privacy at some times, the interior can still be ventilated through the louvers. These elements then have two meanings both culture and climate. The way that Ossipoff ordered them makes them also convey two meanings, both culture and climate. Could he have made a more ridged wood lattice and sliding window combination without the cultural connotations? Of course, but his point was to convey both meanings with the same sentence.

That is the goal then from this research and analysis of the Tropical Modern design language for residential architecture. From the research stand point, first understand the vocabulary, then the syntax, then the language. In terms of 'speaking' the language, first you understand what you are trying to say, find the corresponding vocabulary, match the syntax to the meaning, and then create the sentence. If one were to deeply understand the language, and have a more complex meaning that needed to be conveyed, one could create poetry to convey that.

Poetry

Poetry is also an interesting topic to look at in terms of languages and cultures in the tropics. When you think about it, each language has its own form of poetry. Language is a fixed structure of culture like dance, religion, and architecture, and poetry is the art form of language. There are different ways to structure poems in different cultures, and historically these poems usually have different topics. For an example, the English sonnet is differently structured than the Japanese haiku. This is due to difference in language, yes, but also the difference in culture. If you look at the haiku, it is structured quite rigorously limited to three lines consisting of seventeen syllables in total. Historically, and typically, haiku are about nature, the changing of the seasons, and the passing of time. Look to Japanese culture then and to other fixed forms. Their architecture for example, is quite rigorous, minimal, and has a limited palate, a precise sense of restraint and control, and is based on the module of the *tatami*. Japanese architecture is also designed with similar meanings to haiku. Their houses are centered around a manicured garden in a way to view nature – special *yukimi* shoji are designed to view the snow as it falls on the ground representing the changing of the seasons – and the materials are chosen to show their age, use and decay, representing the passing of time. Both Japanese poetry and architecture represent aspects of their culture.

When looking to create poetry from the design language of the tropics, a good starting place is to look at the poetry of the indigenous culture of the place. In Hawai'i, for example, poetry is in the form of a *mele*. Mele are sung and danced to in hula. Hawaiian language is an oral language, it wasn't until westerns came that they had a written language. The way to pass on knowledge, pass on history, was through the use of mele. In mele were the tales of a place, the history of their people, and the stories of their gods – mele was a way to remember. It was and is an important aspect of Hawaiian culture and language.

The structures of mele were rhythmic and paired with music as to make it easier to remember, but also to elevate it to an artistic form, a celebration of culture. The meanings of the mele were lessons about Hawai'i – they told of the changing of the seasons, the nature of a place, the history of a site, and the relations of their gods. If then you look to Hawaiian indigenous architecture you can see similar structure and meaning.

The construction of Hawaiian hale was also very ritual, there were precise steps and orders for which they were built. These steps are akin to the steps of a dance, ritualistically passed on from generation to generation. The meaning imbedded into their architecture was also the same. *Heiau* platforms were orientated to angles of the sun, corresponding to the sunrise and sunset of the summer and winter equinoxes, representing the changing of the seasons. The nature of the place came through in the material of the architecture, the type of structure built, and the functions for the site which were associated with natural resources and nature. *Lo'i*, wetland agriculture, was placed by the mountain streams, fishponds were constructed were these streams met the ocean, and hale halau were built to shelter canoes by the ocean used by fishermen. The history of a site was represented in heiau construction and the place-names associated with *ahupua'a*. The relations of the gods were seen in the very layout of the *kauhale,* or Hawaiian homestead. The separation of men and women and eating and sleeping relate to stories of the relationships of Hawaiian gods and the *kapu* system.[198]

Each culture has its own form of poetry, and through understanding its priorities and structure, one can understand more about the poetics of their architecture.

The next portion of this paper is a dictionary of sorts, illustrating the vocabulary of Tropical Modernism. It will be used as an introduction to the elements used in Tropical Modern residential architecture and consists of illustrations and detail drawings of elements and either descriptions of these elements in diagrammatic form or through short paragraph. Many of the elements have several meanings to them as they are usually architectural solutions derived from certain areas in the tropics so therefor have cultural meaning, climatic meaning, and can be rendered in different materials. The organization of this dictionary is through the elements of a house, from the top down, and from the inside out.

[198] See Appendix

Vocabulary of Tropical Modernism

Precedent Architects

This set of vocabulary is primarily derived from architects previously studied in this paper, either thoroughly as they represent the masters of Tropical Modernism in their region, or briefly, as they are contemporary practitioners of Tropical Modernism and the breadth of their work is still on going. In detail was mentioned architects from Hawai'i, Florida, California, and Brazil, but other Tropical Modernists of note are from India and Vietnam, as well as other regions. The architect from India is Bijoy Jain of Studio Mumbai (Fig. 121). His work is clean lined and contemporary, but poses an amazing connection with the environment through its use of material, local craftsmanship and central courtyards. There is an incredible attention to detail and craft in his work which adds another layer of mastery to the architecture. A21 Studio, of Vietnam, are also inventive Tropical Modernists in their immersion of user into nature (Fig. 122). Whether through open air buildings or houses that are more like animal habitats than traditional architecture, they converge nature and architecture into one. Vo Trong Nghia, also of Vietnam, has work that is more in line with other contemporary Tropical Modernists with his use of material and planters in his architecture (Fig. 123). In both architects' work, nature is a major building element, planned out not as gardens or landscape, but as vertical elements creating space, interest, and shade.

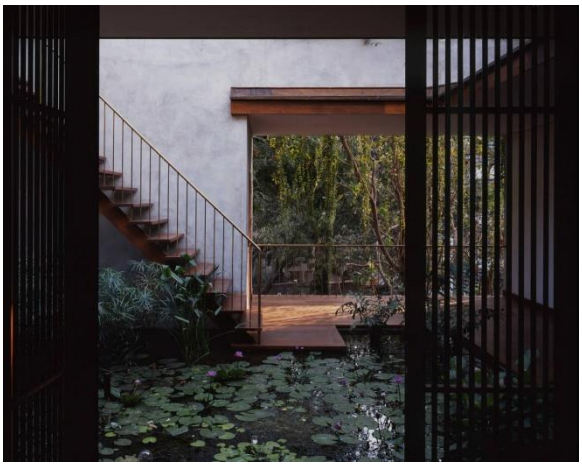


Fig. 121. Bijoy Jain, *House on Pali Hill*. 2012, India.

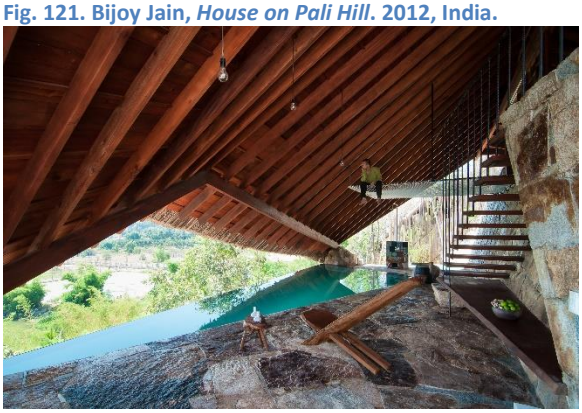


Fig. 122. A21 Studio, *Tent II*. 2014, Nha Trang, Vietnam.

Fig. 123. Vo Trong Nghia, *Binh Thanh House*. 2013, Binh Thanh District, Ho Chi Minh City, Vietnam.

The architect's work that was used for this vocabulary is listed below by region. It includes previous researched architects in the precedent studies, as well as others whose work either represents of influenced Tropical Modernism. Along with elements of Tropical Modernism, there are also elements of regional vernacular architecture that when reimagined by these architects becomes modern in character. The intention behind this list of 'vocabulary' is to create a visual dictionary of sorts, describing the 'words' of the Tropical Modern design language. It doesn't intend to be a full comprehensive list of all the words of Tropical Modernism, but rather the introduction list to begin discussing the design language. Each 'word,' or element, is pictured and illustrated, as well as given a brief description. The intention is to describe the element as a design solution that has many meanings connected with its origin. Whether climatic, cultural, or contextual in their origin, they now represent a part of the Tropical Modern vocabulary.

List of Architects by Region

Hawai'i
- Vladimir Ossipoff
- Craig Steely
- Tom Kundig

Florida
- Paul Rudolph

California
- Richard Neutra
- Pierre Koenig
- Charles Eames

Brazil
- Oscar Niemeyer
- Marcio Kogan (MK27)
- Angelo Bucci (SPBR)

Australia
- Glenn Murcutt
- Richard Leplastrier

India
- Bijoy Jain (Studio Mumbai)

Vietnam
- Vo Trong Nghia
- A21 studio

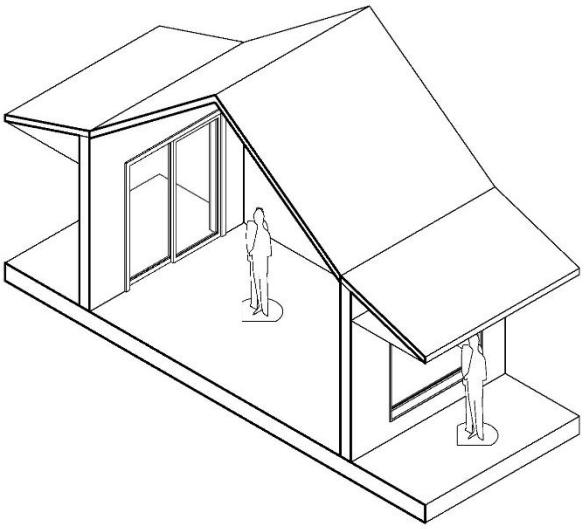
Roofs

Double pitched

Dickey Roof

Fig. 124. Vladmir Ossipoff, *Boettcher House*. 1937, Kailua, Hawai'i.

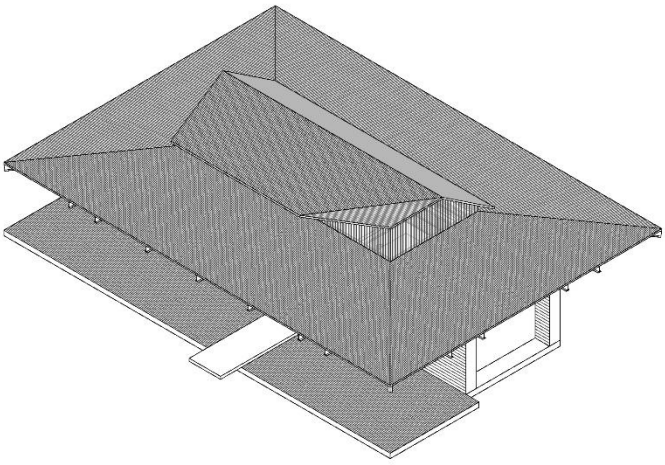
A steep pitched roof type that was vernacular to Hawai'i that had been modified by C.W. Dickey with a second pitch of lower steepness to give a wraparound overhang without increasing the overall height of the building. This example is by Vladimir Ossipoff



Double Pitched with Vent

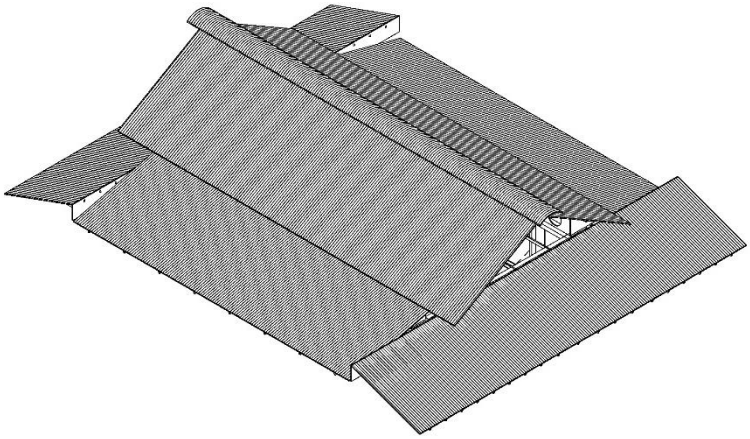
Fig. 125. Tom Kundig, *Slaughterhouse Beach House*. 2009, Maui, Hawai'i.

A reinterpretation of the Dickey Roof, with the high pitch center and low pitch wraparound, it also has a turned up roof section that catches the wind to increase natural ventilation through the building.



Double Pitched

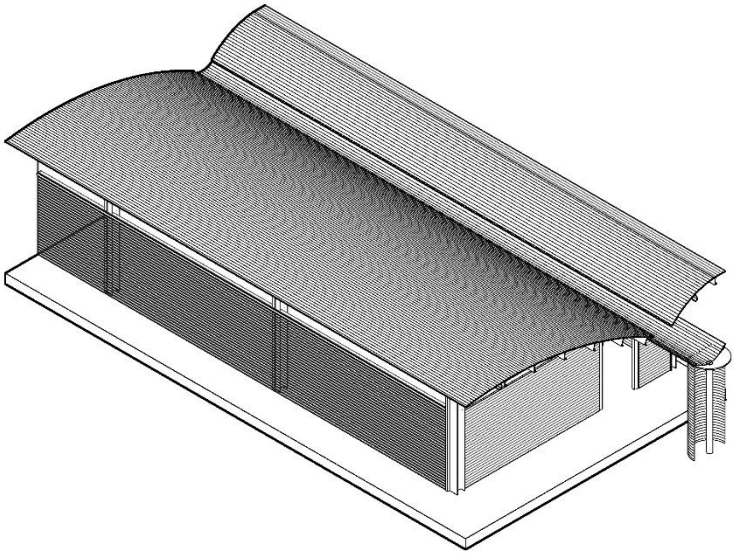
Fig. 126. Richard Leplastrier, *Lovett Bay*. 1994, Lovett Bay, Pittwater, Sydney.



This double pitched roof has Japanese references in the ridge bonnet, as well as the structure of its design. Because if also uses sheet metal, a common material to Australia, there are no mitered joints so roof planes intersect each other at perpendicular faces.

Curved Butterfly Roof

Fig. 127. Glenn Murcutt, *Magney House*. 1982-84, Bingie Point, New South Wales, Australia.



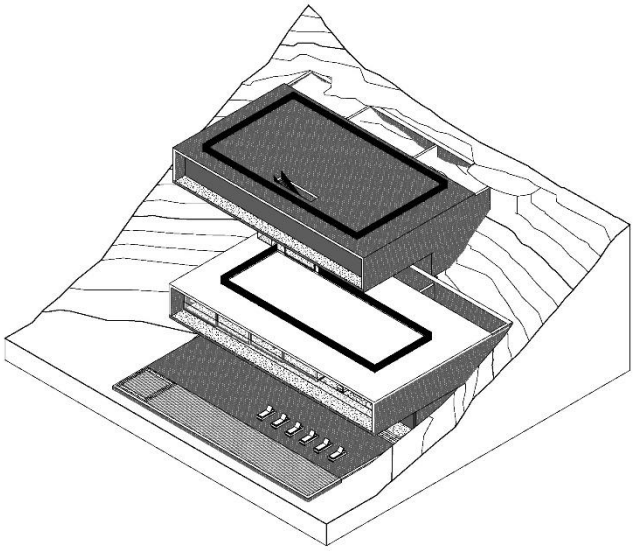
This roof has two pitches that funnel inwardly towards each other. This is done to funnel rainwater into a central gutter and down to catchment tanks. It also opens up the walls to the surrounding views while letting light and air in along the underside of the roof.

Flat

Concrete Flat

Fig. 128. Marcio Kogan, *Paratay House.* 2009, Paratay, Brazil.

A rectilinear flat roof of board formed concrete held up on the ends by concrete walls and intermittently by steel posts. This structure gives long continuous spans and open interiors.



Organic Flat

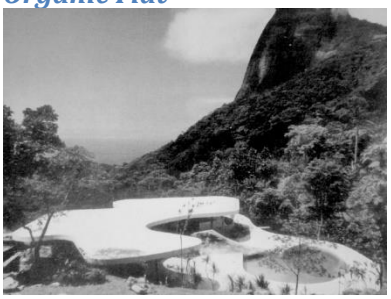
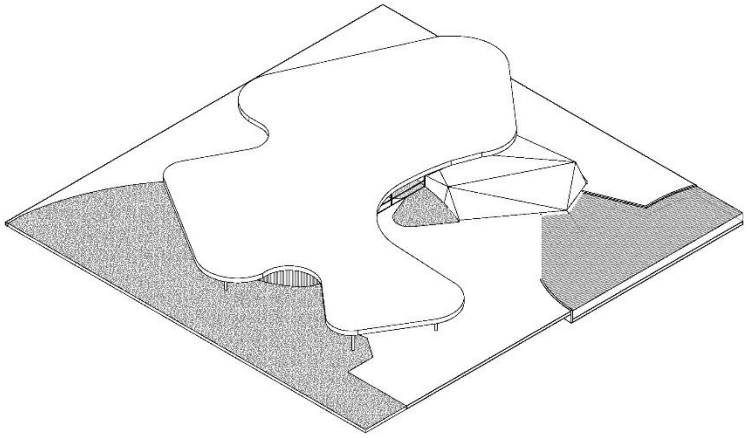


Fig. 129. Oscar Niemeyer, *Canoas House*. 1952, Canoas, Brazil.

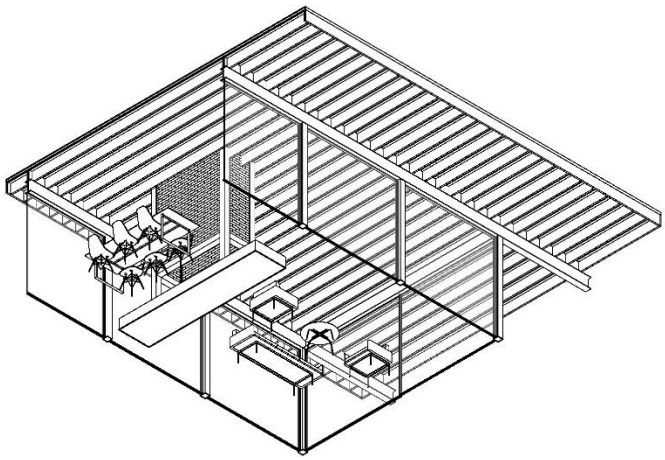
Organic and curvilinear in plan, this roof mimics the topography and gives references to the shapes of nature around it while giving large open spaces beneath with minimal structure.



Steel Cantilever

Fig. 130. Pierre Koenig, *Stahl House*. 1960, Los Angles, California.

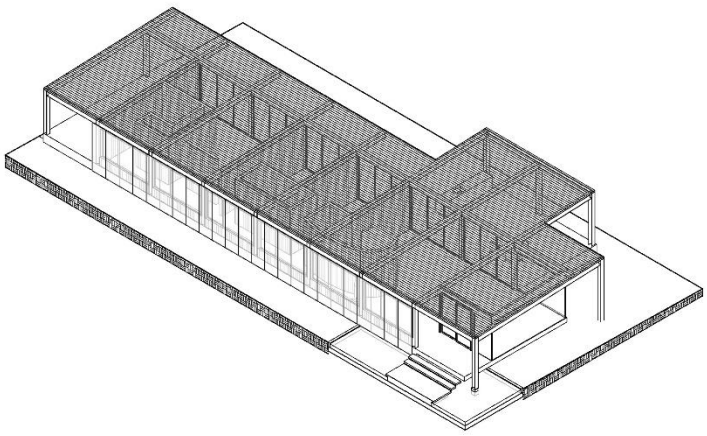
A lightweight steel frame using beams, posts, and corrugated metal decking to reach long cantilevers while giving a lightness to the structure.



Steel Frame

Fig. 131. Craig Steely, *Lava Flow 5*. 2013, Hamakua coast, Hawai'i.

A prefabricated steel box with exposed structure and corrugated metal decking to give a minimal profile.

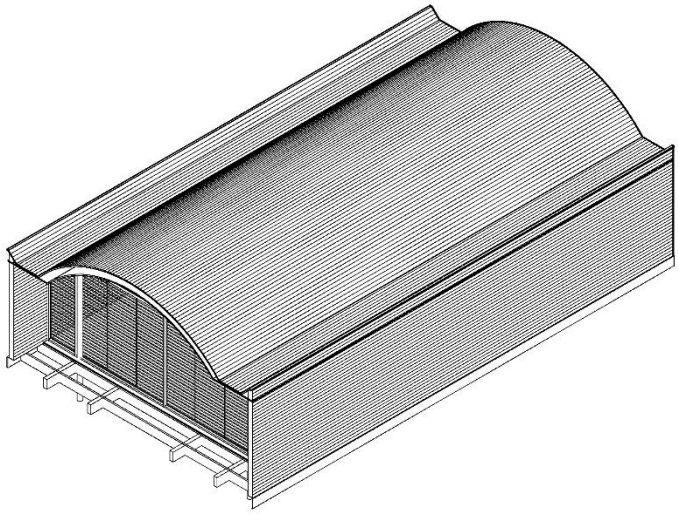


Curved ridge

Barrel Roof

Fig. 132. Glenn Murcutt, *Ball-Eastaway House*. 1980-83, Australia.

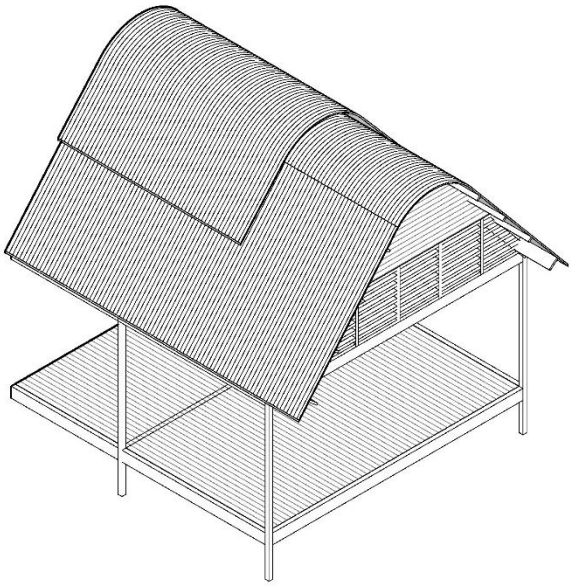
This barrel roof drains rainwater into two gutters on either side of the building while allowing for a light structure.



Curved Ridge

Fig. 133. Glenn Murcutt, *Kempsey Farmhouse*. 1975, New South Wales.

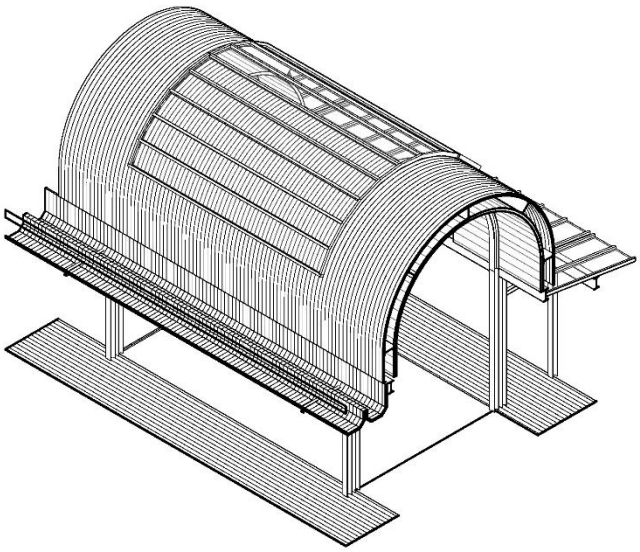
This simple roof of corrugated metal has a curved ridge so that air flows more easily over the building and a ridge vent that lies parallel allows hot air to escape from the interior. Responds to the Australian wool shed vernacular.



High Barrel Roof

Fig. 134. Richard Leplastrier, *Palm Garden House*. 1974-76, Sydney, Australia.

A barrel roof of corrugated metal that makes a full semi-circle in profile, continuing the line from wall to roof seamlessly.



Saddle

Catenary Tension Roof

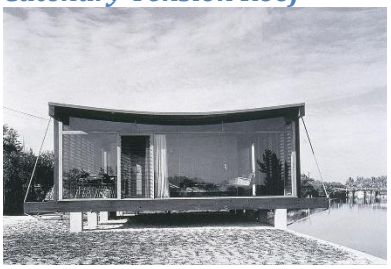
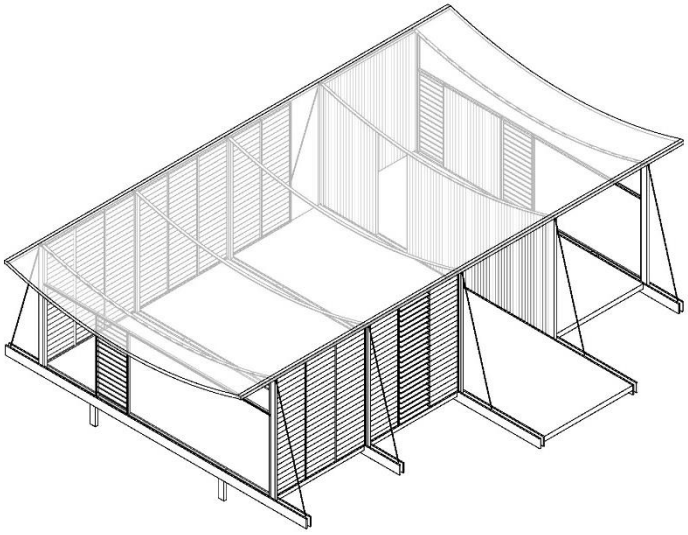


Fig. 135. Paul Rudolph, *Cocoon House*. 1948, Siesta Key, Florida.

Metal straps are suspended from wall to wall and tension cables connect from wall beam down to floor joists to transfer the loads. Infilled between metal straps are sheets of plywood, over which "cocoon" insulating and waterproofing material is sprayed making the roof work as both structure and insulator.



Catenary Truss Roof

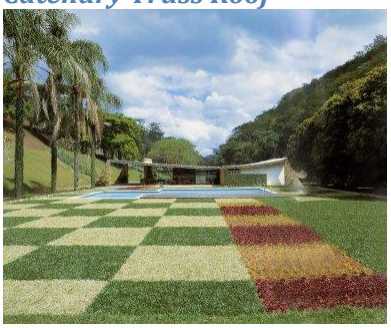
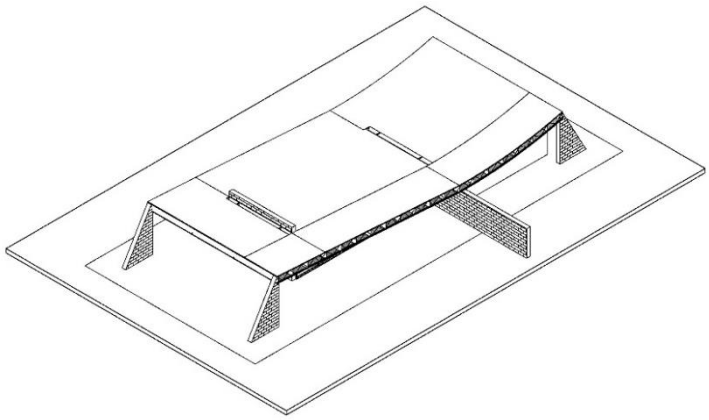


Fig. 136. Oscar Niemeyer, *Edmundo Cavanelas House*. 1954, Pedro do Rio, RJ, Brazil.

A saddle roof of steel trusses suspended from pylon to pylon made of concrete and rock.



A-frame

Tent Roof

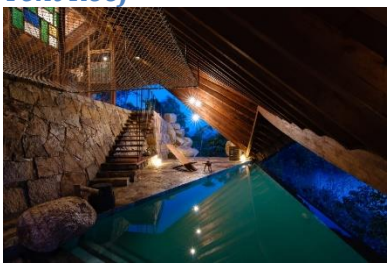
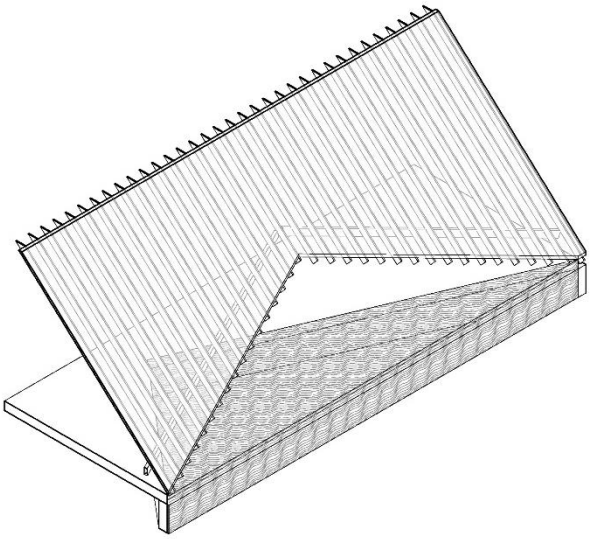


Fig. 137. A21 Studio, *Tent II*. 2014, Nha Trang, Vietnam.

Wood rafters make up the structure of an A-frame like roof that meets at the four corners but has a face with a pulled up section to create an opening out to the view.

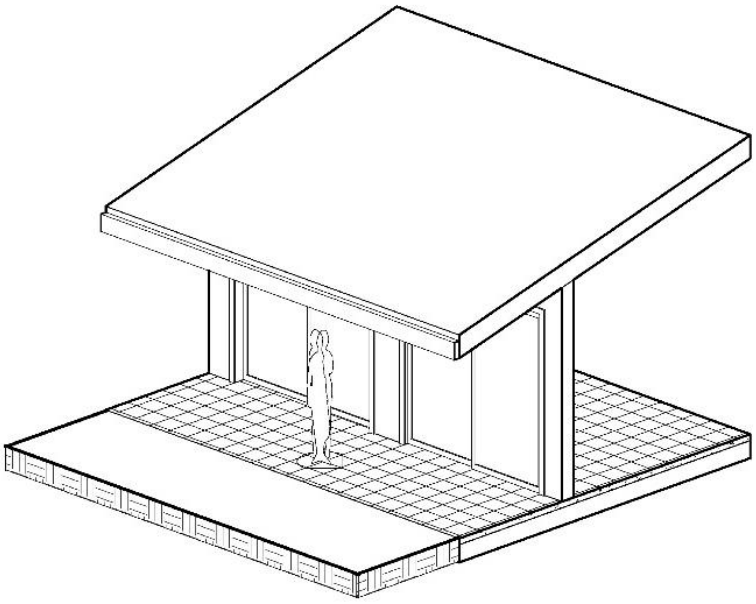


Overhangs

Engawa-like

Fig. 138. Vladmir Ossipoff, *Goodsill House*. 1952, image 2006, Wai'alae, Honolulu, Hawai'i.

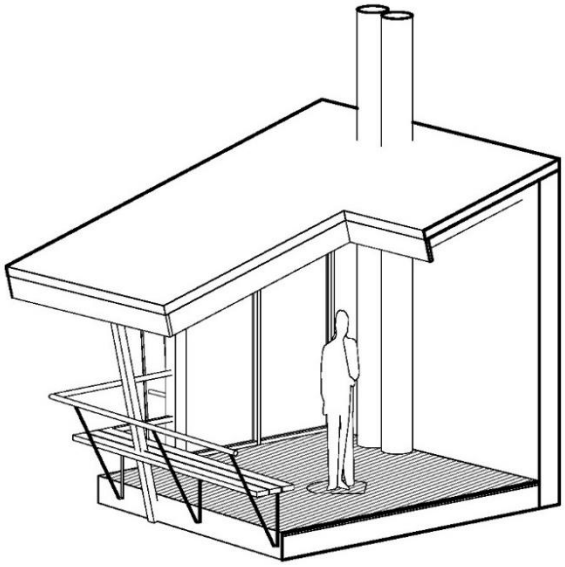
This roof overhand covers the exterior circulation at ground level the wraps around the house. Bleached redwood ceiling with vents cover over the tile walkway that spills out into the garden and is at plane with the interior. Japanese cultural reference.



Balcony overhang

Fig. 139. Vladimir Ossipoff *Liljestrand Residence, exterior lanai*. 1952, image 2013, Makiki Heights, Honolulu, Hawai'i.

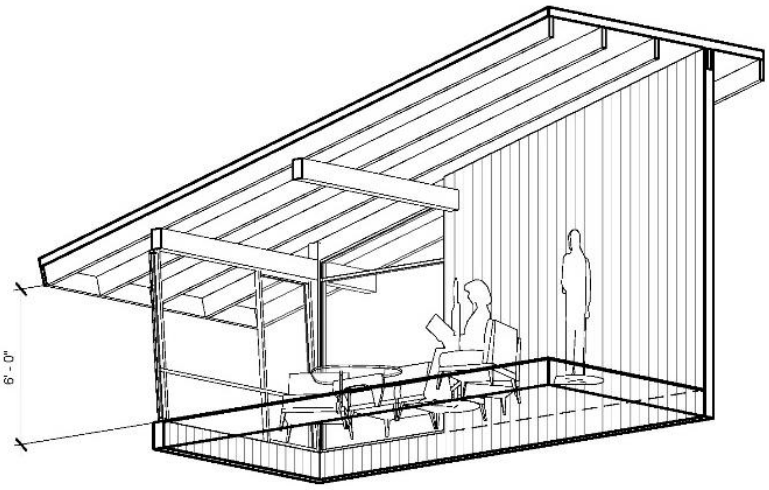
Roof profile extends past face of house to create a covered area outside of doorway out to balcony. Support structure, gutter, railing and bench are all integrated into one design holding up the overhang.



View framing overhang

Fig. 140. Vladimir Ossipoff, *Liljestrand Residence*. 1952, image 2013, Makiki Heights, Honolulu, Hawai'i.

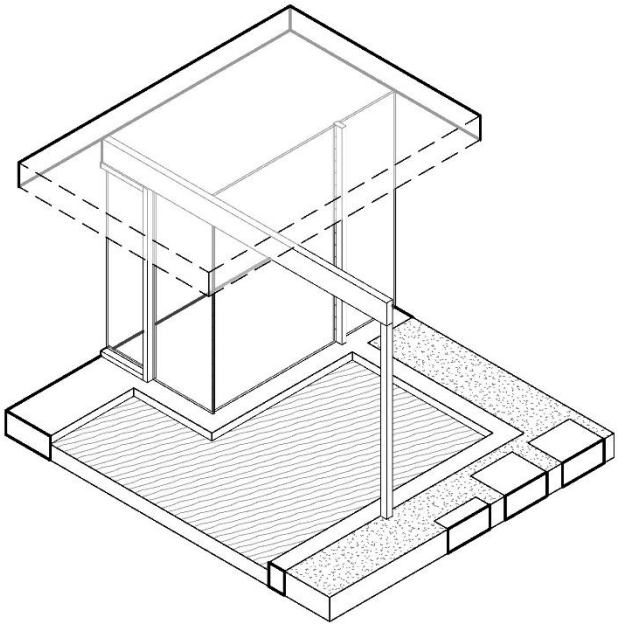
The height from the floor to the bottom of the overhang is at six feet, which shields part of the view to the exterior, while shading the interior from southern exposure. When seated the view opens up and is framed by the overhang protruding overhead. Sliding doors open up as well leaving nothing but a railing between interior and exterior



Outrigger support

Fig. 141. Richard Neutra, *Singleton House*. 1959, Los Angeles, California.

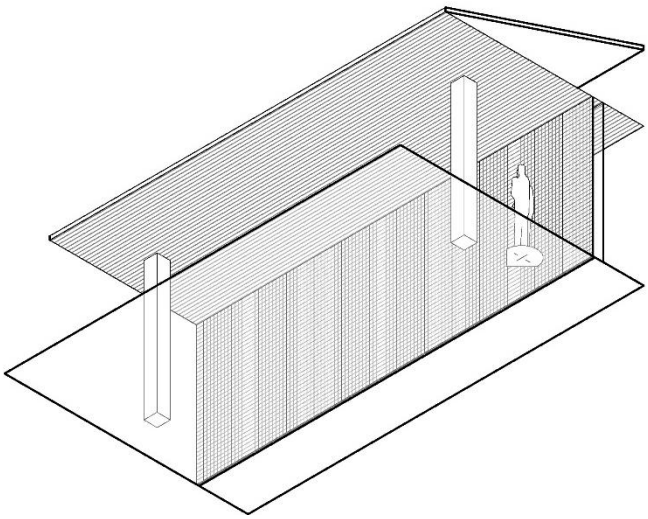
Roof post is brought past the outside edge of the roof line along with the beam that it carries, instead of creating a cantilever, the roof structure captures more space, leaving the corner free of structure and bridging interior with exterior.



Verandah

Fig. 142. Marcio Kogan, *Bahia House*. 2010, Bahia, Brazil.

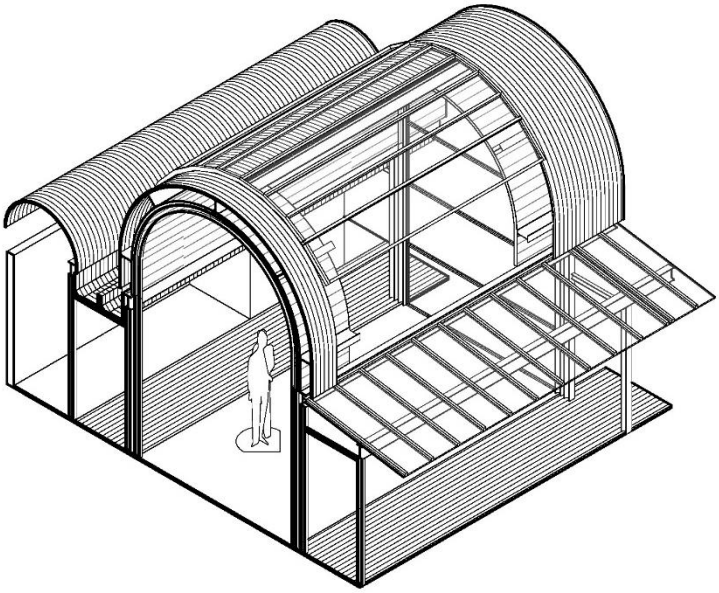
This verandah works like the engawa of Japan, but because of its depth it serves as a long outdoor room as well as just a circulation path.



Adjustable

Roll Away Roof

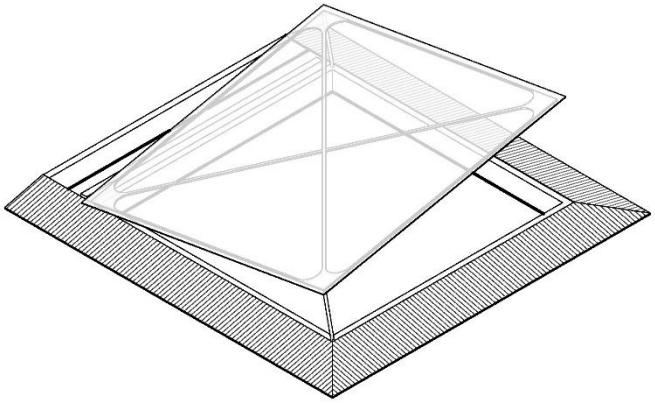
Fig. 143. Richard Leplastrier, *Palm Garden House*. 1974-76, Sydney, Australia.



This barrel roof has a section that can be rolled up and away like a garage door or curtain, opening the interior out to the sky and trees above.

Sail Roof

Fig. 144. Richard Leplastrier, *Watson Bay House*. 1997-98, Sydney, Australia.

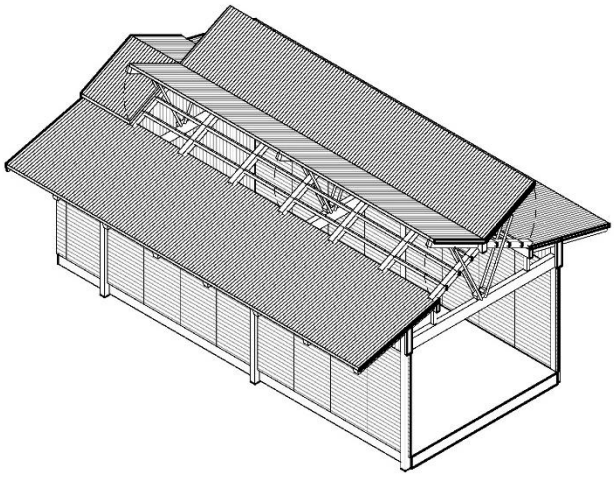


This fabric roof is supported at the corners and along an actuated frame that can be adjusted so that corners can rise or lower depending on time of day, sunlight, rainfall and user comfort.

Flap Roof

Fig. 145. Tom Kundig, Hawai'i Residence. Hawai'i.

The roof can open up two flaps on either side of the ridge letting light and wind flow through the interior space. Flaps are adjusted by mechanical actuators.

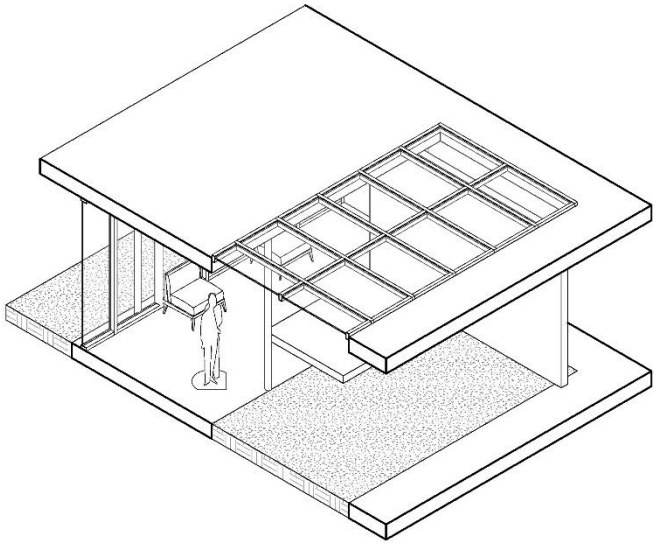


Trellis

Solarium

Fig. 146. Ralph Twitchell with Paul Rudolph, *Revere Quality House*. 1948-49, Siesta Key, Florida.

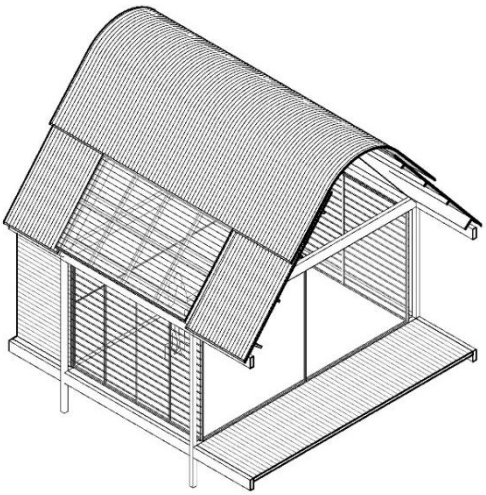
This courtyard space is covered with a light frame and mesh screen, keeping insects and debris out while still allowing natural air, light and rain to reach the interior lawn.



Sky Window

Fig. 147. Glenn Murcutt, *Marie Short House*. 1974-75, Australia.

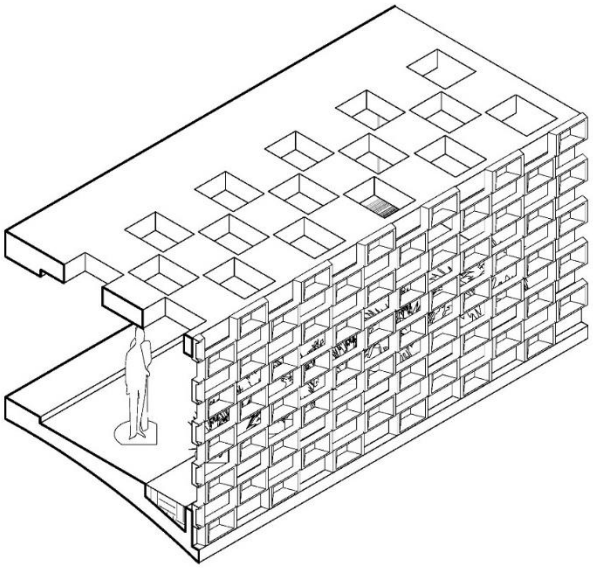
A trellised screen covers an area mitigating sunlight while still making an area that is both outdoors and part of the house.



Concrete checkerboard

Fig. 148. Vo Trong Nghia, *Binh Thanh House*. 2013, Binh Thanh District, Ho Chi Minh City, Vietnam.

A concrete checkerboard acts as a sun shade over an area, protecting it while still leaving it open to the elements.

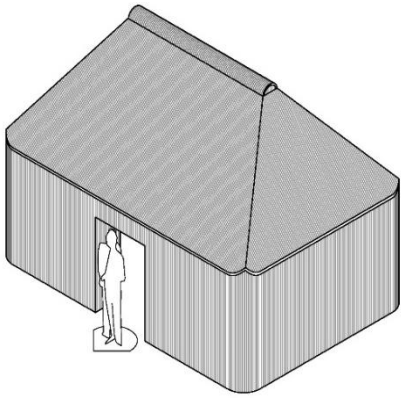


Thatch

Hawaiian Thatch

Fig. 149. Hawaiian Hale

Thatched roofing material made from pili grass or braded ti leaves.

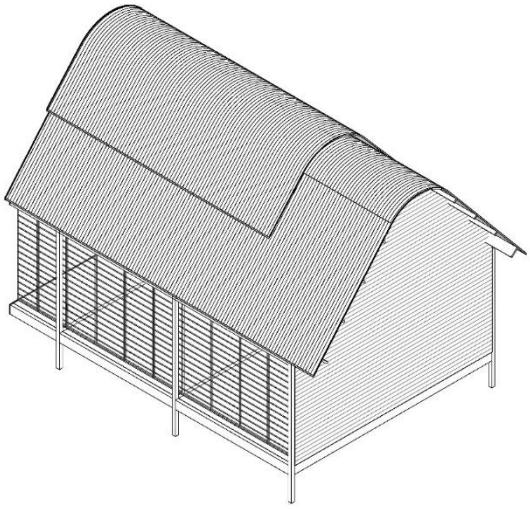


Metal

Corrugated Metal

Fig. 150. Glenn Murcutt, *Marie Short House*. 1974, Australia.

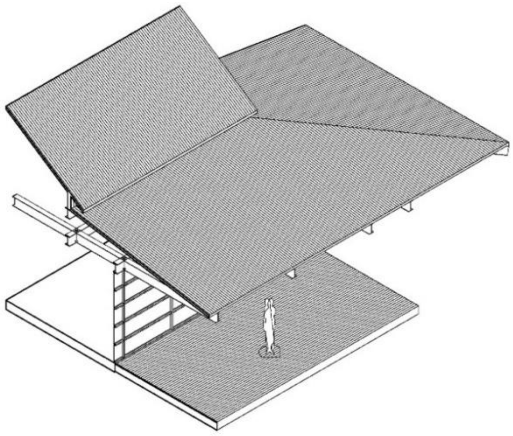
An inexpensive and easy to work with material, corrugated metal was most commonly used in rural vernacular architecture throughout the tropics for its durability and ease of transport. It also can be easily bent.



Corrugated Metal

Fig. 151. Tom Kundig, *Slaughterhouse Beach House*. 2009, Maui, Hawai'i.

This flat roof of corrugated metal also speaks to the vernacular architecture.

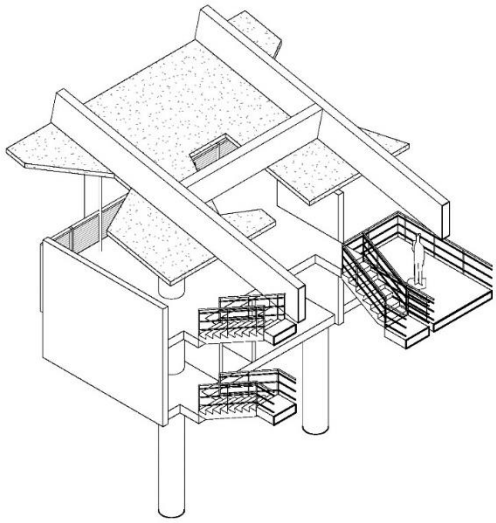


Concrete

Cast in place

Fig. 152. Angelo Bucci, *House in Ubatuba*. 2005-09, Ubatuba, SP, Brazil.

This roof is of one cast in place piece that cantilevers from structural columns and also supports the roof top pool. Concrete roofs can be poured in many different shapes and profiles.



Tile

Portuguese Tile

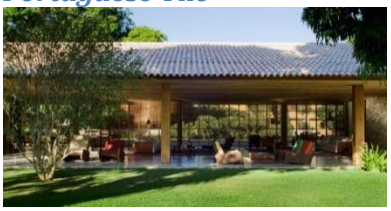
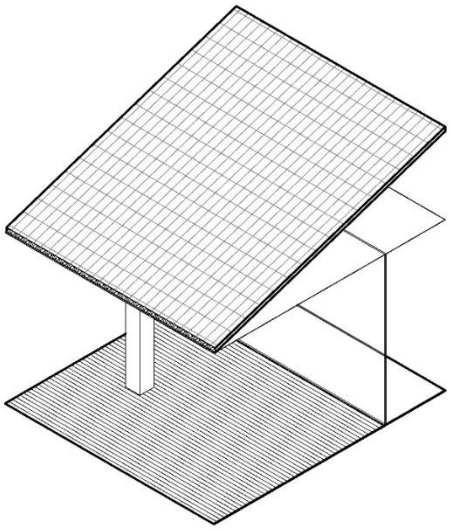


Fig. 153. Marcio Kogan, *Bahia House*. 2010, Bahia, Brazil.

This roof material is imported from Portugal with the Portuguese colonial architecture of Brazil. Though it is not indigenous it speaks to the vernacular architecture of the region. It is made from clay and protects against sun and rain quite well.



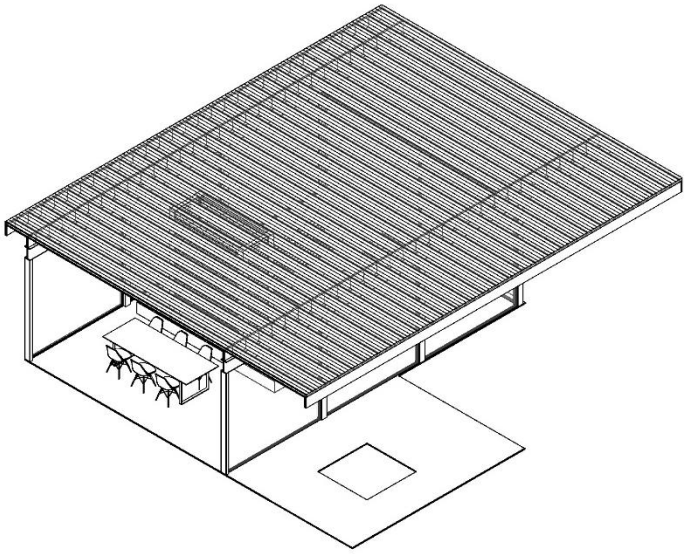
Structure

Steel

Post and beam

Fig. 154. Pierre Koenig, *Case Study House No. 22*. 1960, Los Angeles, California.

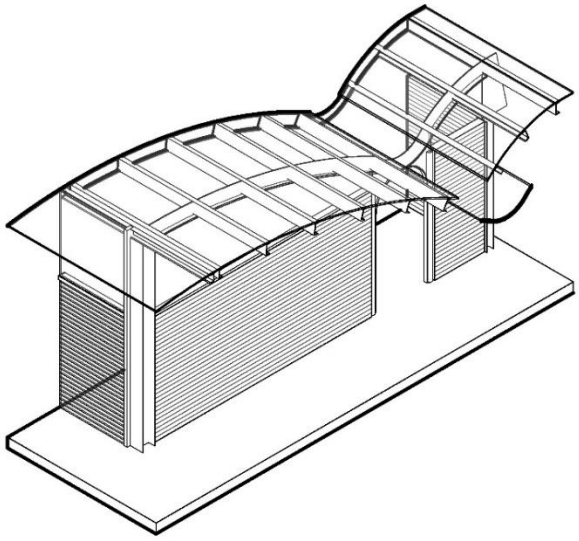
This simple structural system creates rectilinear forms and large open spaces with minimal supports. The roof beams are held up by steel posts and the steel decking crosses between these members creating a lightweight structure.



Custom steel

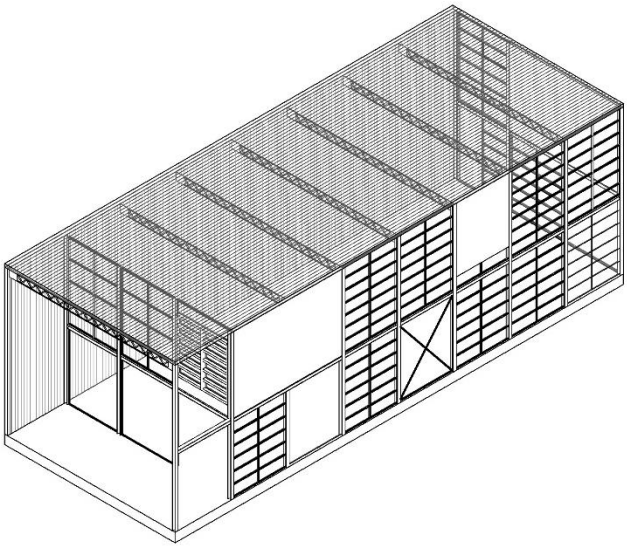
Fig. 155. Glenn Murcutt, *Magney House*. 1982-84, Australia.

To get certain curves in the roof profile, or to articulate certain load pats, custom steel components were used for the beams and the posts made by local fabricators.



Exposed truss

Fig. 156. Charles and Ray Eames, *Eames House*. 1949, Los Angeles, California.



This simple post and beam structure created longer spans by using engineered steel trusses to span from corner to corner. The trusses were then left exposed from underneath for their aesthetics.

Suspension Truss

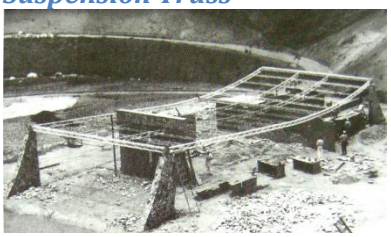
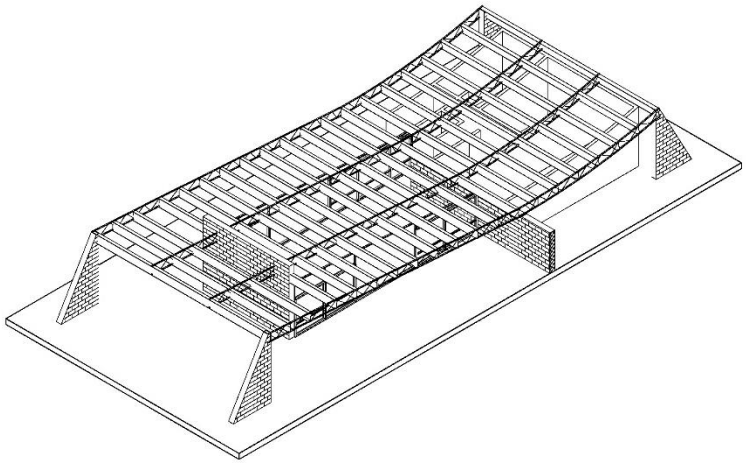


Fig. 157. Oscar Niemeyer, Edmundo Cavanelas House. 1954, Pedro do Rio, RJ, Brazil.



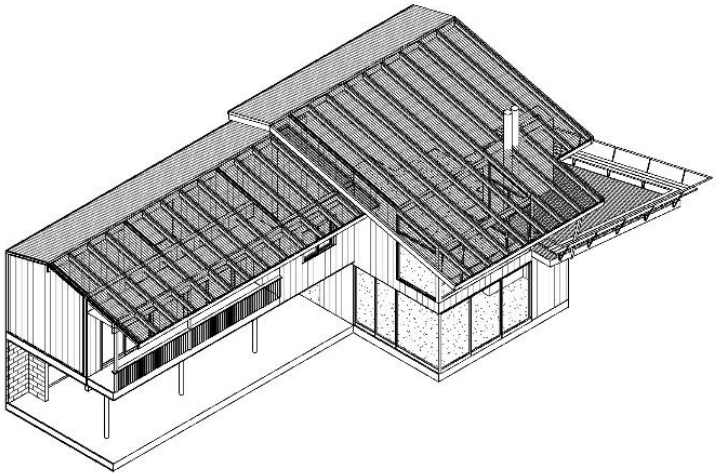
Four large trusses were suspended from pylon to pylon, creating the suspended roof structure and then were left ventilated through the sides.

Wood

Post and Beam

Fig. 158. Vladimir Ossipoff, *Liljestrand Residence*. 1952, Hawai'i.

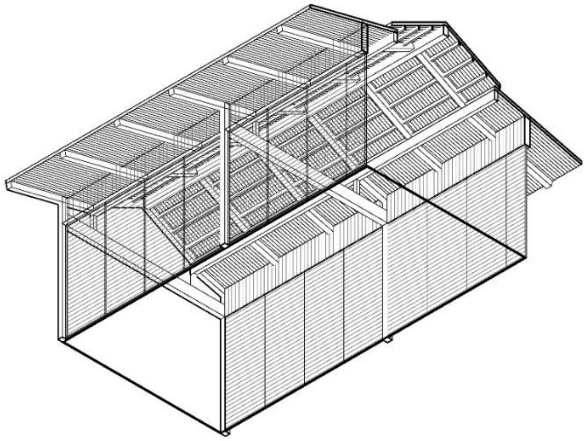
Using Japanese carpenters and simple joinery, the wood post and beam structure was left exposed from the interior rather than covered up by walls and gyp board. Roof structure was covered by a wood ceiling of boards creating a continuous plane.



Post and beam expressed

Fig. 159. Tom Kundig, Hawai'i Residence. Hawai'i.

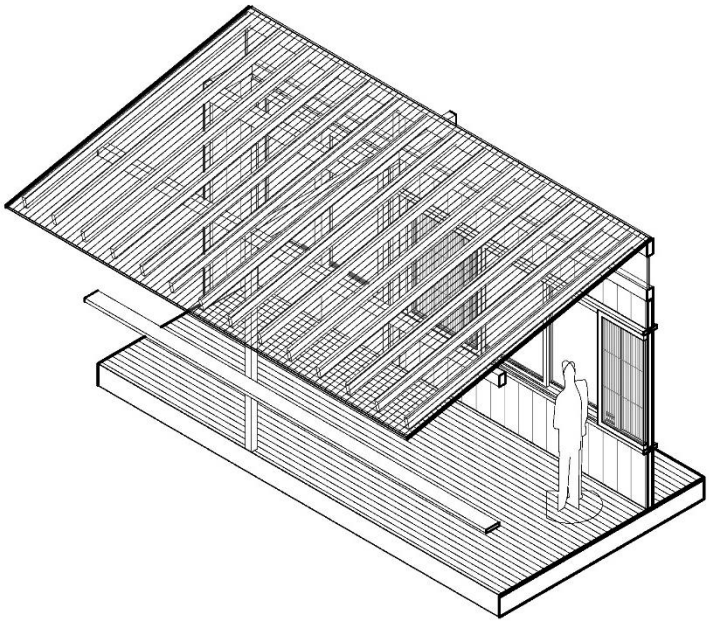
Roof rafters and purlins are expressed from bellow as there is no false ceiling covering them. This helps articulate the structure.



Japanese Craftsmanship

Fig. 160. Richard Leplastrier, Rainforest House. 1988-91, Australia.

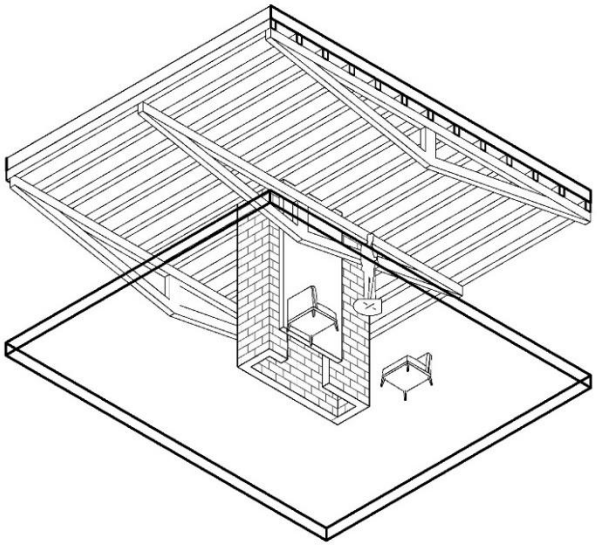
The Japanese structure consists of heavy roofs but relatively thin supporting structure. Thin or non-existent walls along with transoms under the roof allow for a relatively light appearance of the wood. The corrugated metal is also left exposed under the roof and can be seen between the purlins.



Inverted Truss

Fig. 161. Twitchell with Rudolph, *Denman Residence*. 1946-47, Florida.

Inverted wood trusses hang below the ceiling creating a flat roof, long span, and interesting structural element in the interior.



Concrete

Board-Formed Irregular

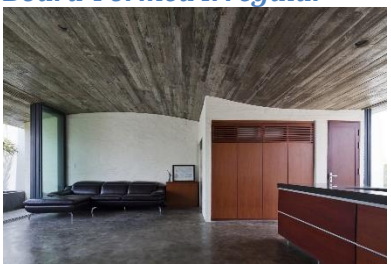
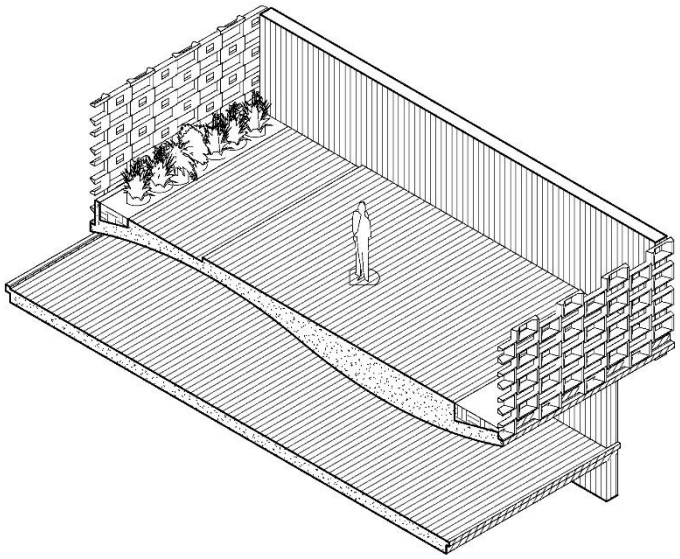


Fig. 162. Vo Trong Nghia, *Binh Thanh House*. 2013, Vietnam.



Board-Formed concrete slabs with flat tops and irregular bottoms of either barrel vaults or other curvilinear forms. The depth of the peak of the arc hides the extra reinforcement used instead of beams. Also the light carried across the ceiling surface helps with daylighting.

Large Cast in Place

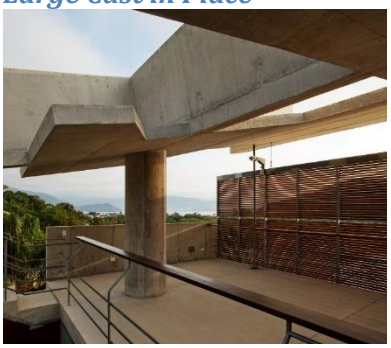
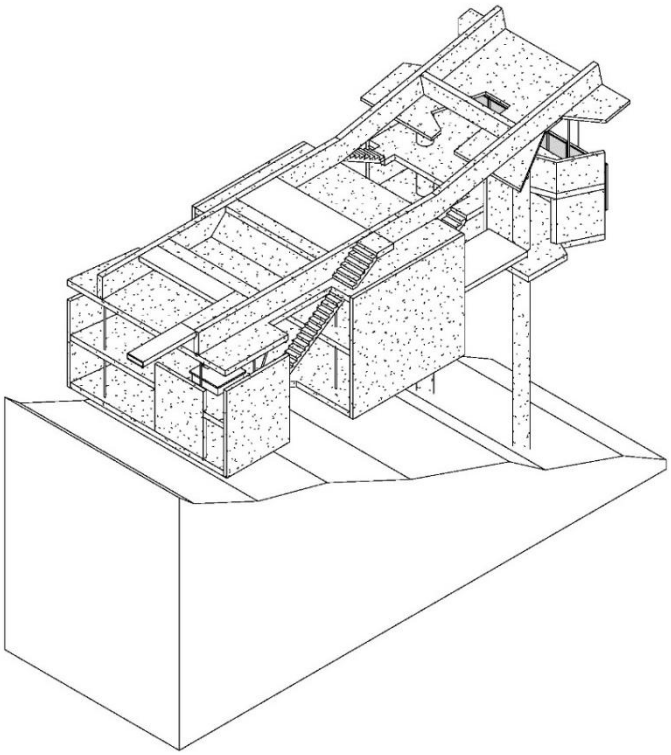


Fig. 163. Angelo Bucci, *House in Ubatuba*. 2005-09, Ubatuba, SP, Brazil.

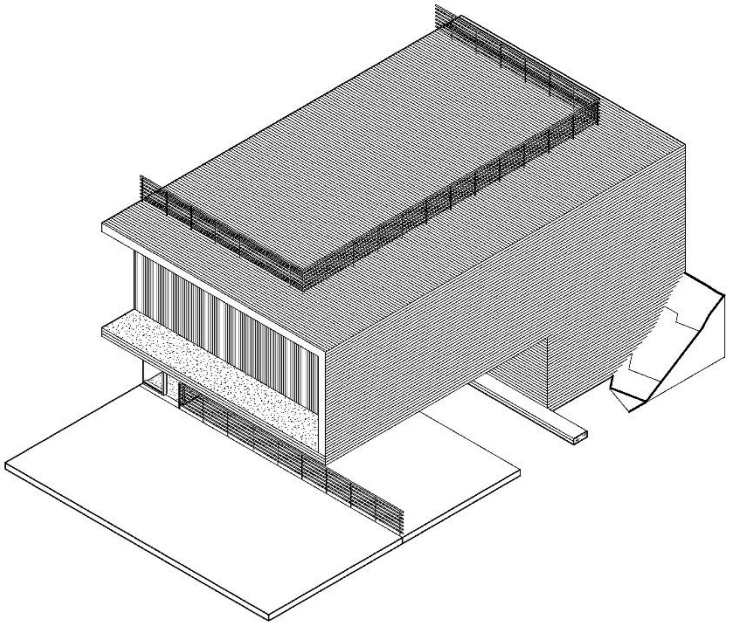


Using concrete structure fit to build a bridge, let alone a house, the levels can be set at different heights and consist of large cantilevers and few structural walls. The large beams, slabs and columns support irregular shapes and work both as structure, shading and spatial organizers.

Board-Formed Rectilinear

Fig. 164. Marcio Kogan, *Paratay House.* 2009, Paratay, Brazil.

Large rectilinear planes are cast on site with board-formwork which brings a varied texture to the flat surface. This texture emphasizes a vector in its direction, either bringing the proportions horizontal to the eye, or vertical.

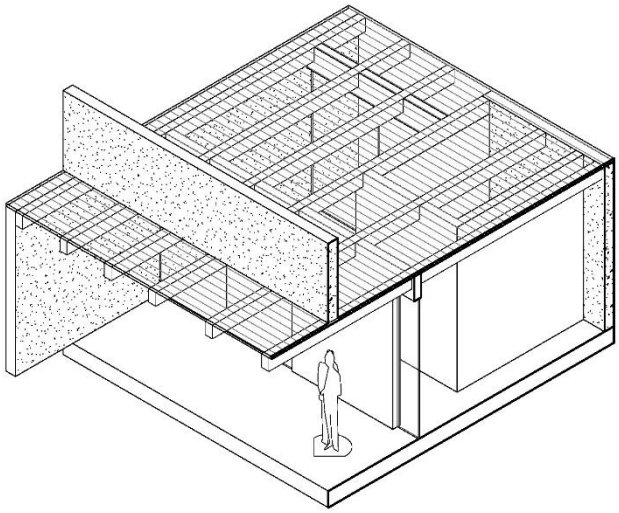


Composite

Concrete and Wood

Fig. 165. Craig Steely, *Lava Flow 7*. 2013, Big Island, Hawai'i.

Large cast in place beams and columns support glulam roof beams anchored underneath which makes for an efficient roof structure and long spans between supports so views are uninterrupted.



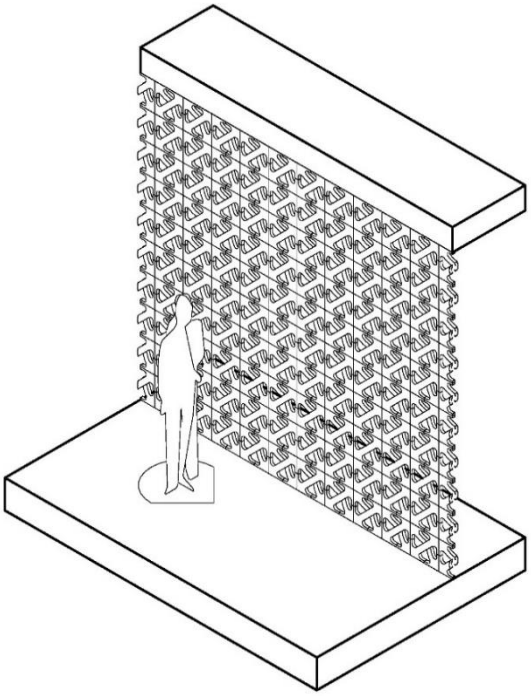
Walls

Ventilated

Cobogós

Fig. 166. Marcio Kogan, Cobogos House. 2011, São Paulo, Brazil.

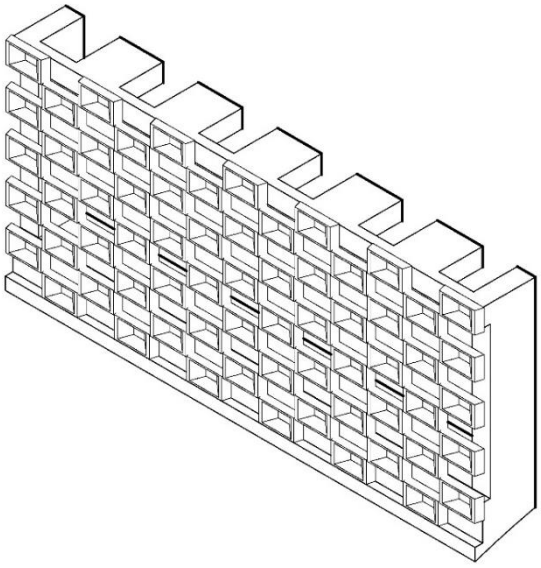
Hollow elements, originally made of concrete or ceramic, created in the 20th Century. Its name derives from the initials of the surnames of three engineers that worked in Recife, Brazil: Amadeu Oliveira Coimbra, Ernest August Boeckmann and Antônio de Góes. This variety is made by artist Erwin Hauer.



Breeze Block

Fig. 167. Vo Trong Nghia, *Binh Thanh House*. 2013, Vietnam.

Concrete masonry units stacked on their side so that the opening allows for the passage of air. Created in a variety of shapes and patterns and became a staple of mid-century Tropical Modernism.

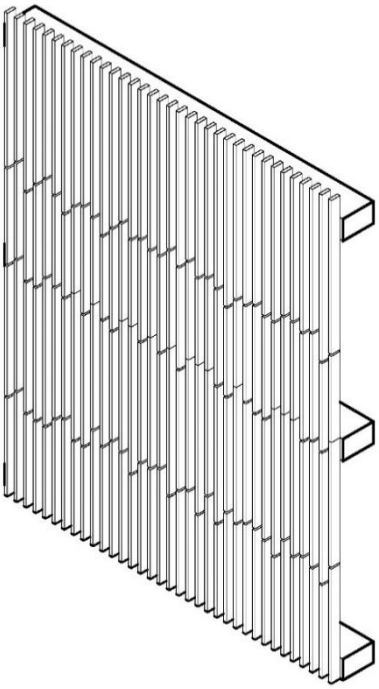


Vertical louvers

Wood Lattice

Fig. 168. Bijoy Jian, *House on Pali Hill*. 2012, Bandra, Maharashtra, India.

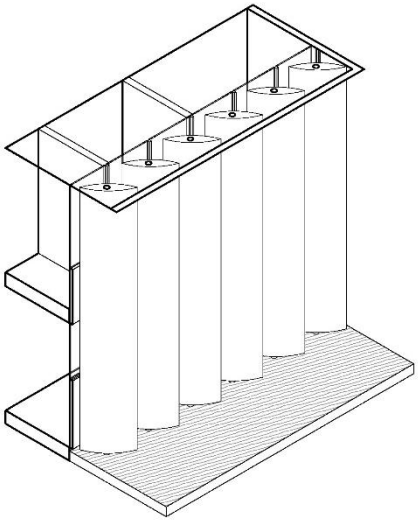
Dimensional members of wood nailed to the structure beyond create a vail like shading wall that also allows air to flow through. Here they are placed in an irregular pattern.



Vertical Shading Fins

Fig. 169. Richard Neutra, *VDL Research House II*. 1964, California.

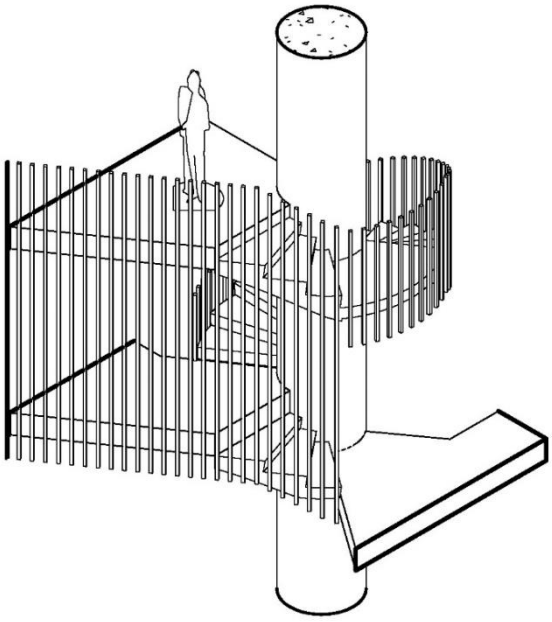
Large articulating metal fins in an airfoil shape that shade openings from the sun while allowing bounced indirect light to filter inside. Protects from morning and afternoon sun.



Wood Slats Regular

Fig. 170. Angelo Bucci, *House in Ubatuba*. 2005-09, Brazil.

Dimensional wood members nailed to the structure beyond create both a railing and a wall. Used here they enclose a space while keeping it open to the elements.



Wood Shading Fins

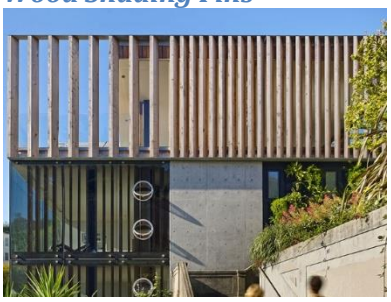
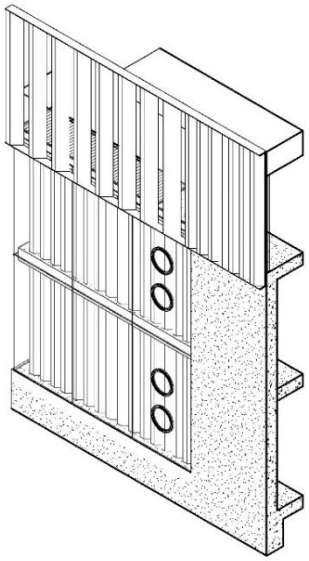


Fig. 171. Craig Steely, Peter's House. 2013, San Francisco, California.

Large wood members fixed in place within a frame to shade and enclose a space. Two examples, either used indoors and are articulating, or exterior and fixed.



Shading

Metal Grille

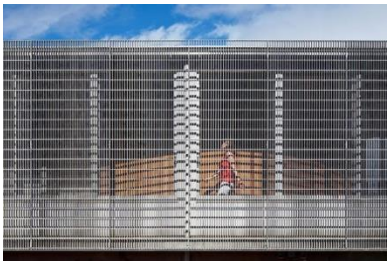
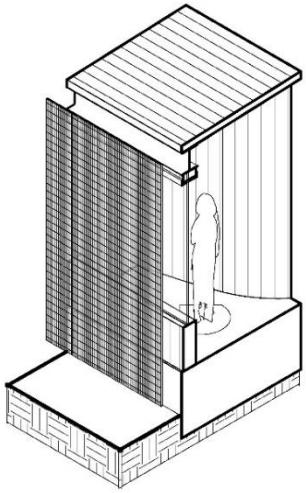


Fig. 172. Craig Steely, *Lava Flow 5*. 2013, Hamakua coast, Hawai'i.

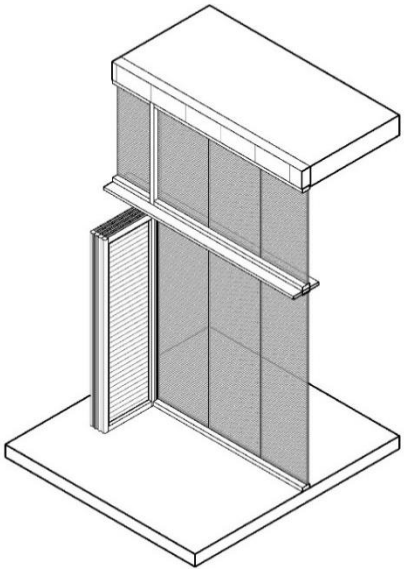
Industrial metal grates used typically for flooring are placed on the outside of a window span creating shading from direct sunlight.



Horizontal Wood Lattice

Fig. 173. Bijoy Jian, *Palmyra House*. 2007, Nandgaon, Maharashtra, India.

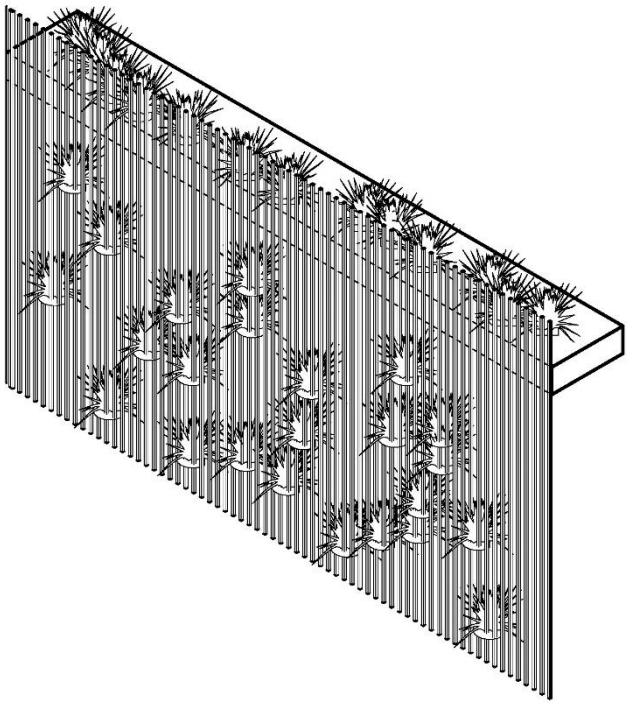
Small wood members are fixed within a frame to create a grille like screen that shades an opening while still allowing ventilation.



Green Lattice

Fig. 174. Vo Trong Nghia, *Green Renovation*. 2013, Hoàn Kiếm District, Hanoi, Vietnam.

Vertical members act as the framework for which vines grow on and plants are hung. The cage like framework, when overgrown, acts as a living shading wall that adds vegetation to the building as well as privacy.



Bamboo and Vinyl Walls

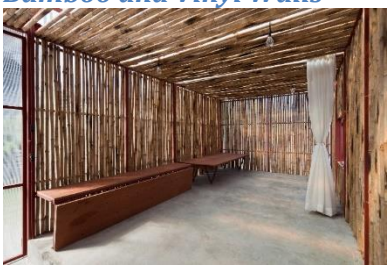
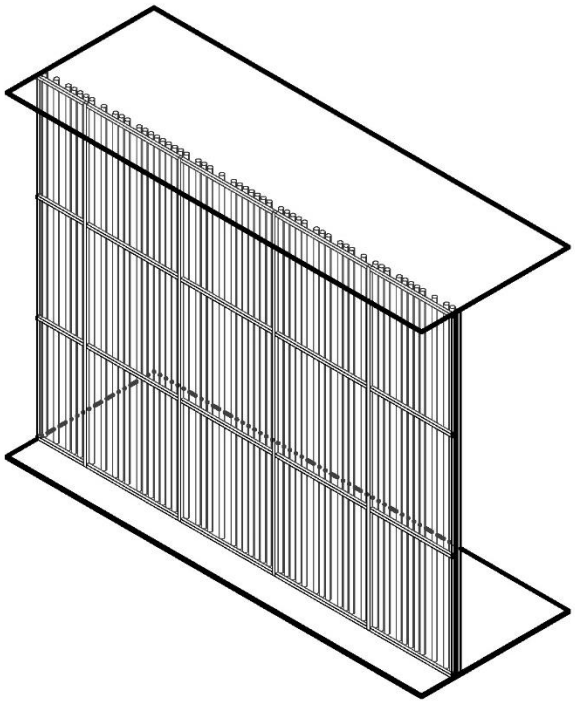


Fig. 175. Vo Trong Nghia, Low Cost House. 2012, Dongnai, Vietnam.

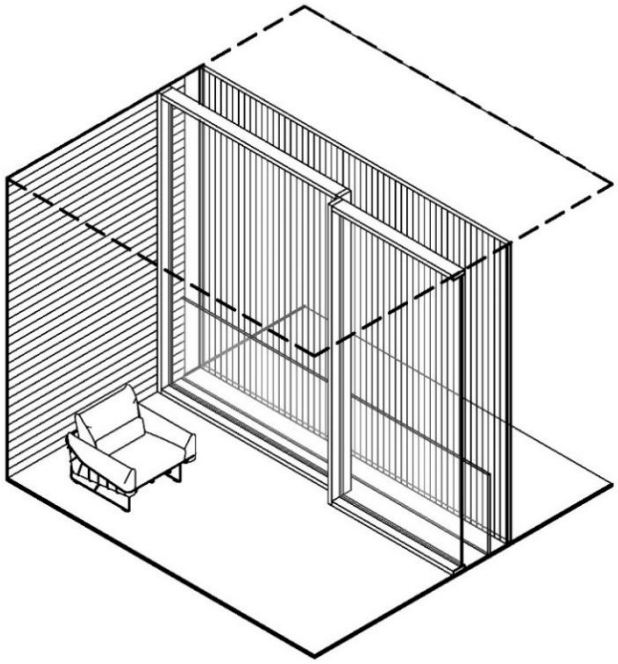
A metal framed structure wrapped on the outside with vinyl plastic sheets that diffuse the light then infilled between the structural frame with bamboo. From the outside the structure is clean and modern, from the inside it takes the appearance of a bamboo hut. The vinyl keeps out rain and wind while allowing light unless shaded by the bamboo.



Stick Screen

Fig. 176. Marcio Kogan, *Paratay House.* 2009, Paratay, Brazil.

Sticks and reeds are fixed within a frame to create a shading wall referencing indigenous building character and the primitive hut, while updating it to modern needs.

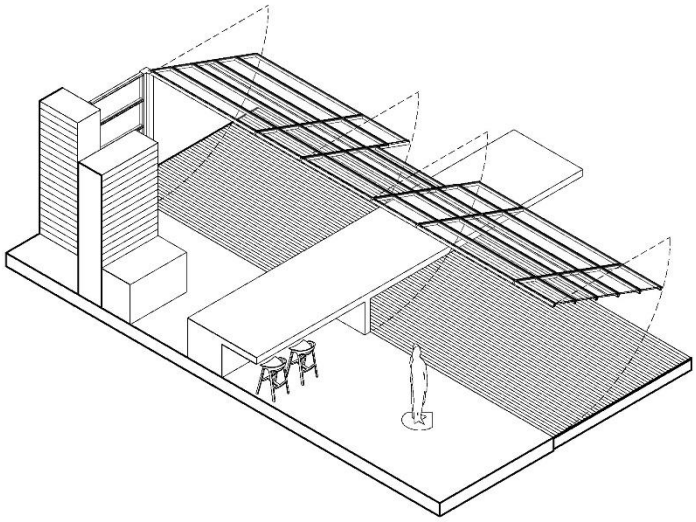


Pivot walls

Pivot Glazing Wall

Fig. 177. Tom Kundig, *Slaughterhouse Beach House*. 2009, Maui, Hawai'i.

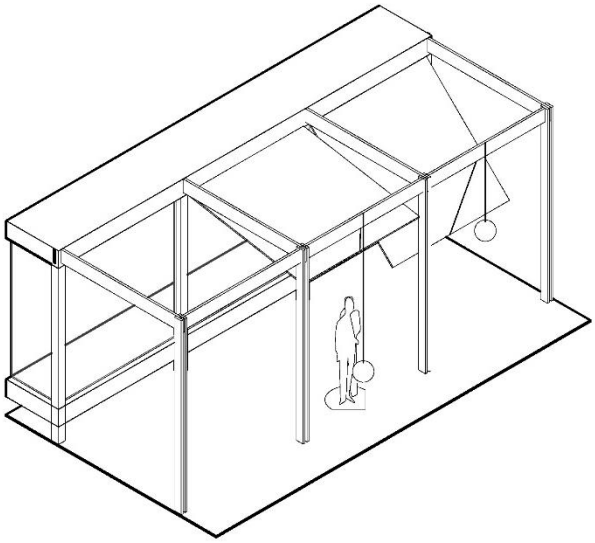
A steel framed curtain wall articulates around an axis at its top. When opened the interior space is joined with the exterior. This pivot wall also includes cutouts for a built-in table that goes from interior to exterior.



Adjustable Shading Wall

Fig. 178. Paul Rudolph, *Walker Guest House*. 1952-53, Florida.

Outriggers on all sides of the house support the pulley system to raise and lower shading walls with a counterweight.



Pivot Wall

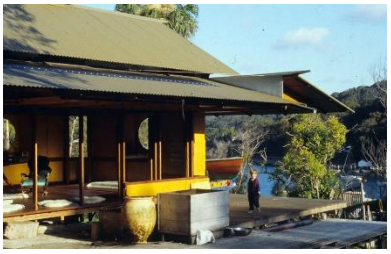
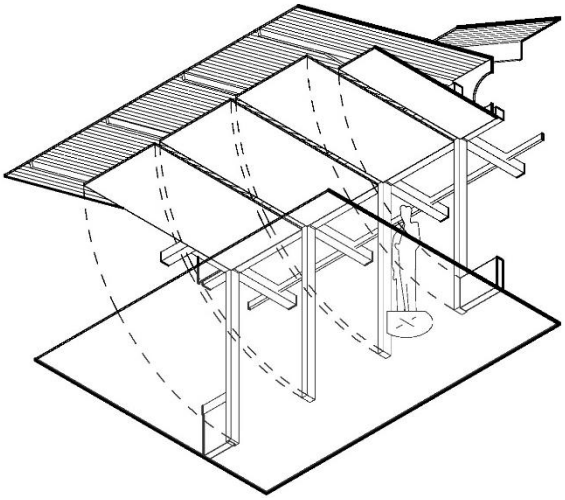


Fig. 179. Richard Leplastrier, *Lovett Bay*. 1994, Sydney.

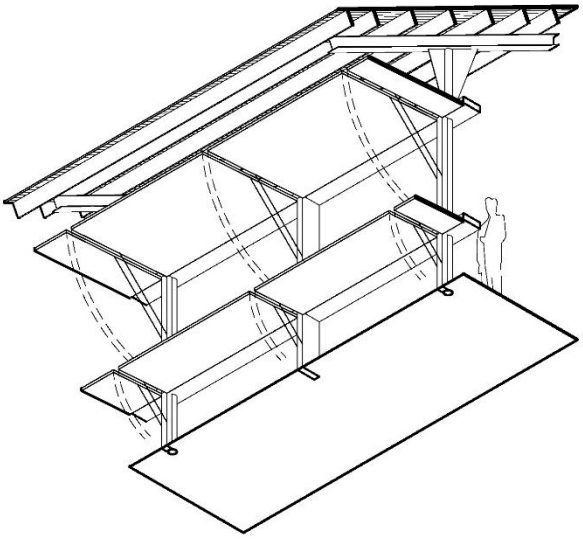
Pivoting walls swing upward to connect the interior space with the outdoors when desired, or close it off in inclement weather or privacy.



Multiple Pivot Walls

Fig. 180. Glenn Murcutt, Marika Alderton House. 1991-94, Australia.

Sections of the wall swing up to open and provide shading. Openings also work as entries, windows or awnings.

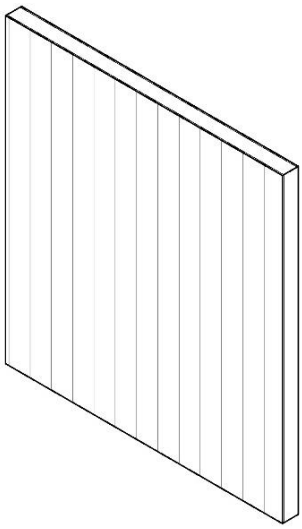


Wood

Bleached Redwood

Fig. 181. Vladimir Ossipoff, *Liljestrand Residence*. 1952, Hawai'i.

With a special recipe for bleaching the redwood boards, Ossipoff created a very de-saturated homogenous plane with still the texture and warmth of wood.

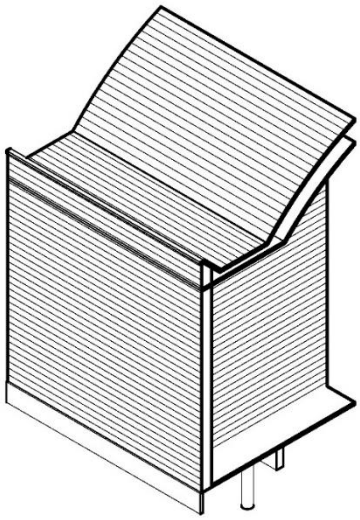


Metal

Corrugated Metal

Fig. 182. Glenn Murcutt, *Ball-Eastaway House*. 1980-83, Australia.

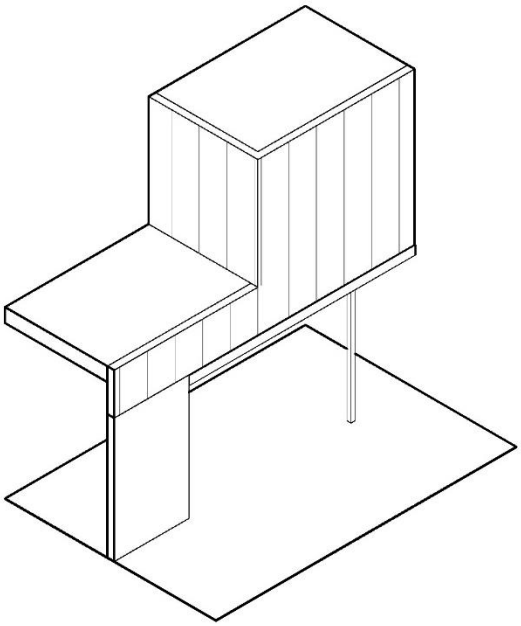
Corrugated metal sheets are placed on the outside of the house. This references industrial and rural vernacular structures.



Copper

Fig. 183. Bijoy Jian, *Copper House II*. Chondi, Maharashtra, India.

The rusted copper standing seam cladding works as a weather barrier, but because of its nature turns brown quickly and eventually green with exposure to the salt air in the tropics. This aging has a certain wabi-sabi characteristic and blends in well in the pallet of the tropics.

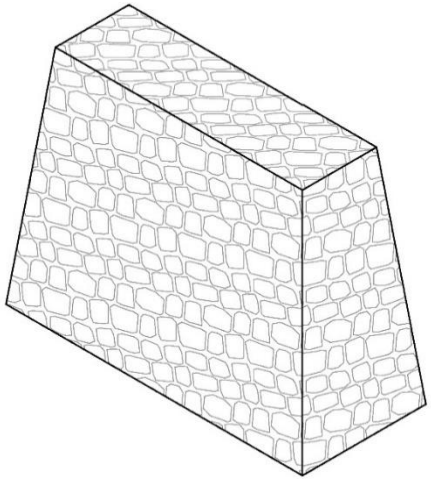


Stone

PaPōhaku

Fig. 184. Edwin Bauer, *Oahuan*. Honolulu, Hawai'i.

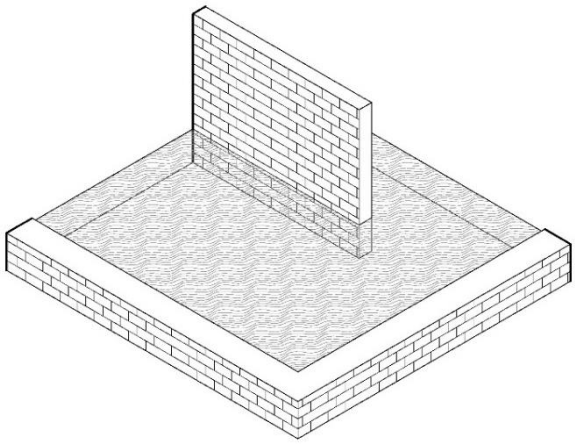
Pōhaku meaning stone and Pa meaning wall or fence. Usually referring to stone walls of lava rock.



Stacked Rock Wall

Fig. 185. Bijoy Jian, *Ustav House*. Satirje, Maharashtra, India.

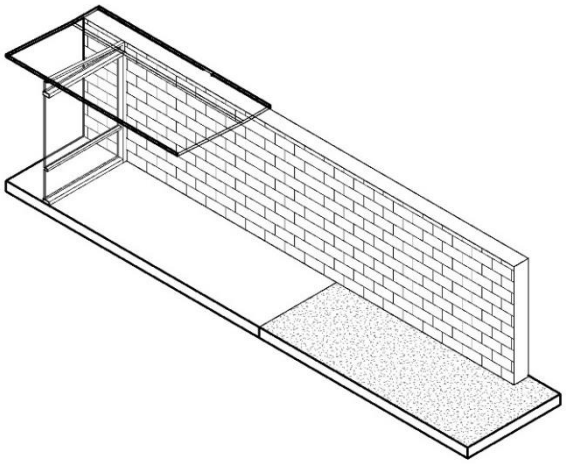
Locally sourced stone reflects the pallet of the land.



Laid Rock Wall

Fig. 186. Oscar Niemeyer, Cavanelas House. 1954, Pedro do Rio.

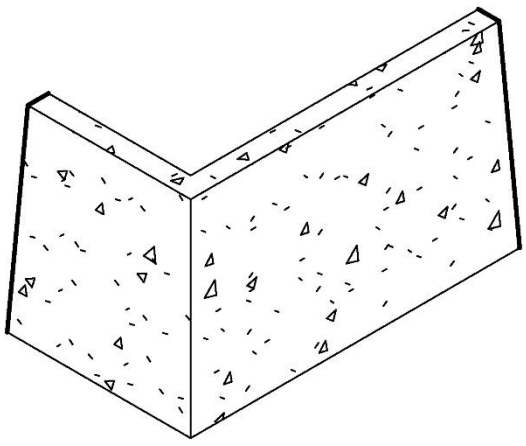
A single protruding rock wall going from inside to out connect the two spaces as well as the material to the land.



Large Aggregate Concrete

Fig. 187. Vladimir Ossipoff, Pauling Residence. 1957, Hawai'i.

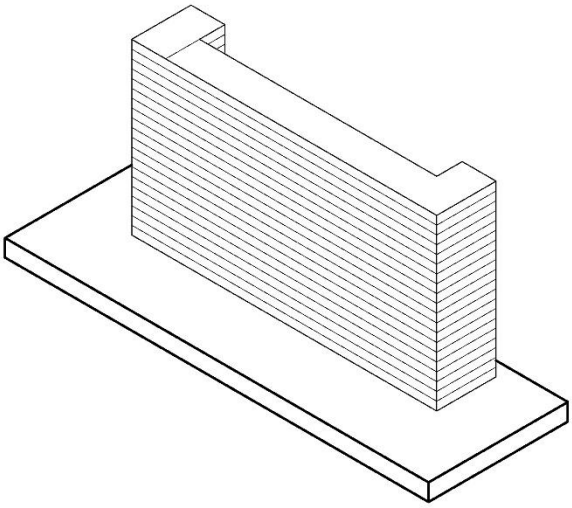
Large rocks were placed into a concrete pour and were exposed after the formwork was removed. This process replaced up to 75% of the typical aggregate. This was also a way to create a locally sourced rock wall but in a modern way.



Rammed Earth

Fig. 188. Tom Kundig, *Slaughterhouse Beach House*. 2009, Maui, Hawai'i.

Rammed earth walls use a form work and then layers of dirt from the site that is compressed into their forms. They work well for thermal massing and are a sustainable building material.



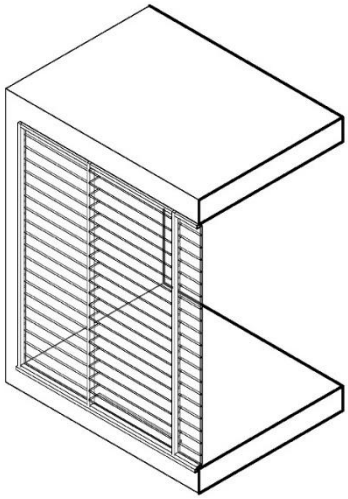
Windows

Jalousies

Glass Jalousies

Fig. 189. Ralph Twitchell with Paul Rudolph, *Leavengood House*. 1950-51, Florida.

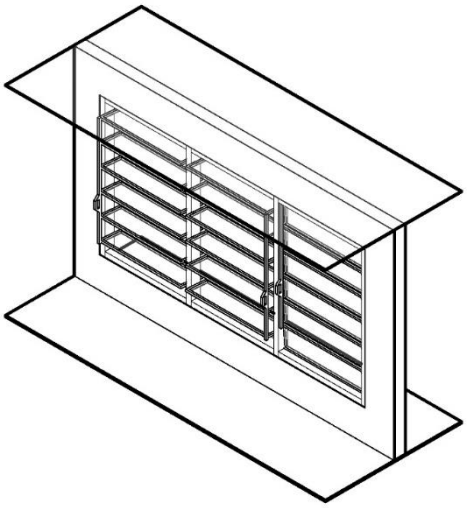
A vernacular window type of most tropical regions. Metal clasps and hardware hold glass panes of four to six inches in depth.



Hand crafted

Fig. 190. Bijoy Jian, *Ustav House*. Satirje, Maharashtra, India.

Most jalousies are factory made, here they were hand made with larger panes of glass and custom wood hardware and frames.

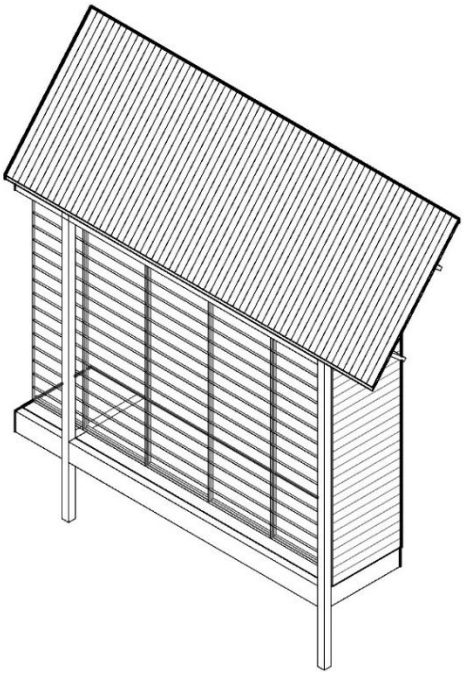


Louvers

Retractable Metal Venetian Blinds

Fig. 191. Glenn Murcutt, *Marie Short House*. 1974, Australia.

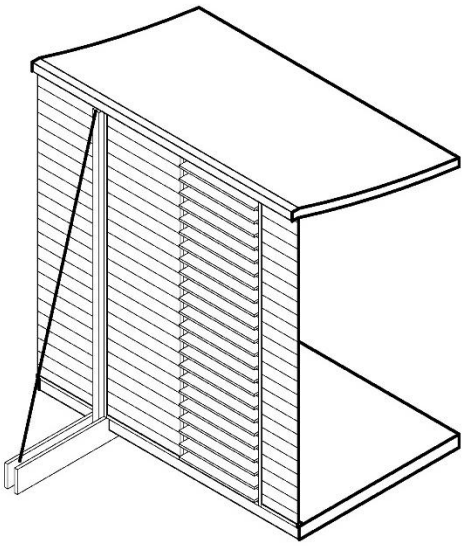
Small blade metal louvers that can be retracted upward like blinds, either working to shade the interior while allowing wind flow, enclose the interior from wind and sun, or open up completely.



Wood Louvers

Fig. 192. Twitchell with Rudolph, *Cocoon House*. 1950, Florida.

Wood louver blades with metal hardware and clips. Good for shading while allowing ventilation and views.



Pivot

Porthole Window

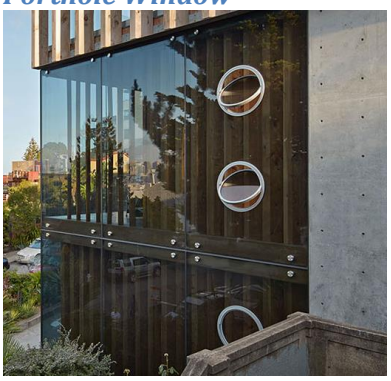
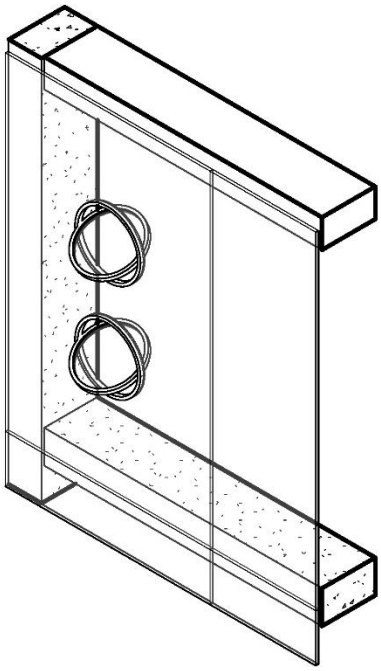


Fig. 193. Craig Steely, *Peter's House*. 2013, San Francisco, California.

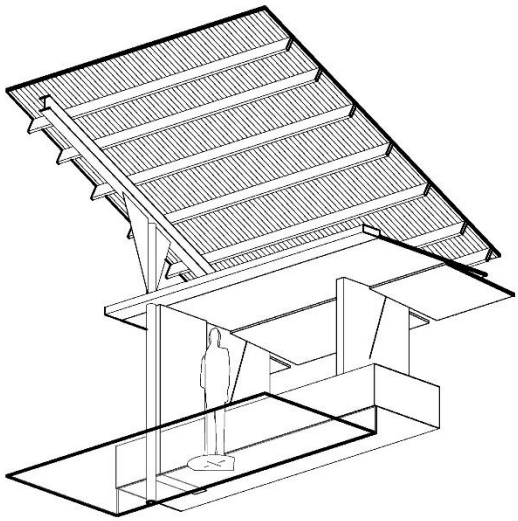
Porthole windows, as typical with ships and yachts, here are fixed within a frameless glass pane. This allows ventilation through the glass pane while giving a maritime character to the building.



Up Pivot Windows

Fig. 194. Glenn Murcutt, Marika Alderton House. 1991-94, Australia.

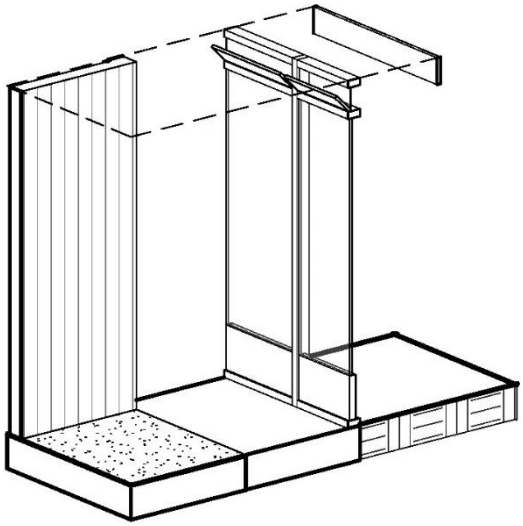
Solid panels swing upward and out to create a shaded opening to the outdoors, allowing views, wind, and indirect sunlight. Here they are placed at countertop height.



Transom

Transom Flaps

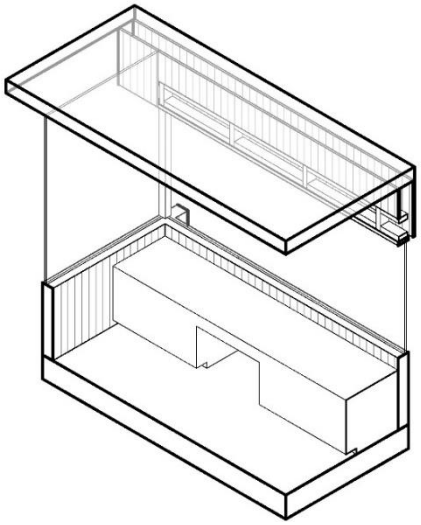
Fig. 195. Vladimir Ossipoff, *Liljestrand Residence*. 1952, Hawai'i.



Flip down flaps above the windows on the windward side of the house allow controlled air to flow into the interior without blowing papers around or obstructing views when closed.

Transom Vents

Fig. 196. Richard Neutra, *Hinds House*. 1951, Los Angles, California.



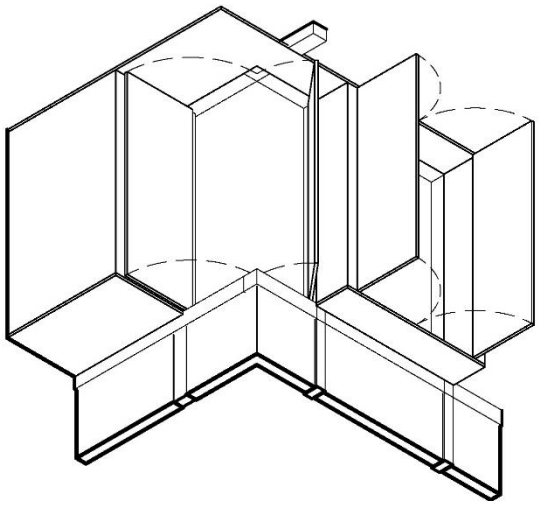
Vents above the windows allow controlled air to flow into the interior without blowing papers around or obstructing views when closed.

Hinged

Shutters

Fig. 197. Richard Leplastrier, *Lovett Bay*. 1994, Sydney.

Solid shutter windows with no glass panes that can be opened to allow views. Here the two panels when closed create a corner of the house.



Sliding

Shoji Panels

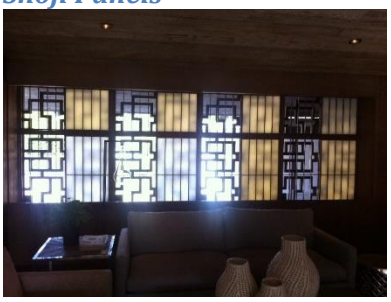
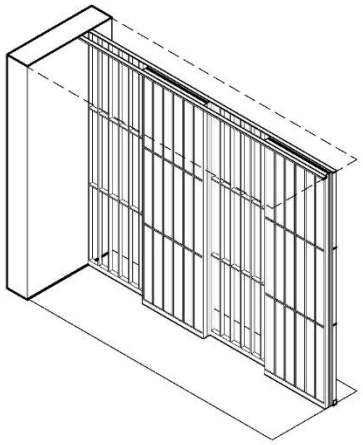


Fig. 198. Vladimir Ossipoff, Diamond Head Residence. 1963, Hawai'i.

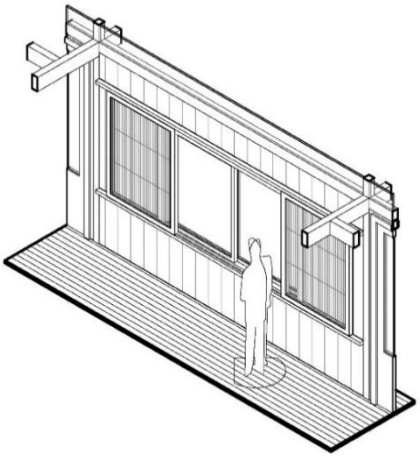
Sliding wood frames with paper insets diffuse light and add privacy. When opened they slide away. References to traditional Japanese architecture.



Woven Lattice Panel

Fig. 199. Richard Leplastrier, Rainforest House. 1988-91, Australia.

Woven strips of wood within a frame, work as rain shutters and shading for the sliding glass panels behind.

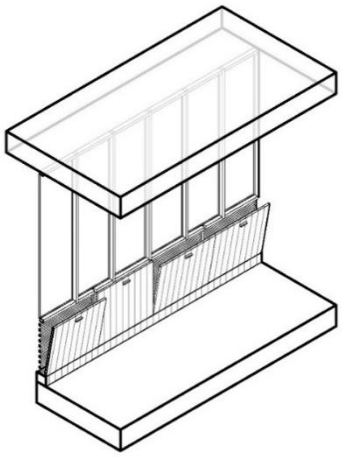


Sill vents

Sill Vent

Fig. 200. Richard Neutra, *Wilkins House*. 1949, California.

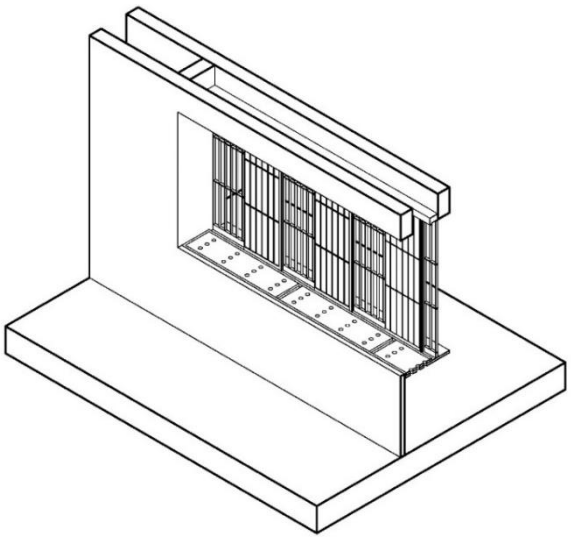
Flip out panels beneath windows hide screened openings that lie flush when closed.



Sill Vent

Fig. 201. Vladimir Ossipoff, Diamond Head Residence. 1963, Hawai'i.

A small ledge with a screened in vent sits below the window allowing airflow even when windows are closed. The vent can be closed by sliding the covering panel over so that openings don't align.



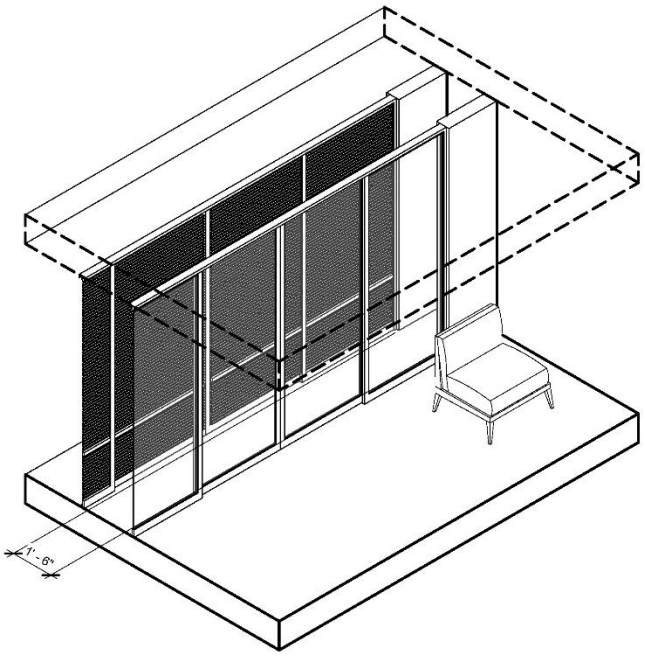
Doors

Sliding

Double set

Fig. 202. Vladimir Ossipoff, Blanche-Hill House. 1961, Kāhala, Hawai'i.

Working like the amado and shoji of Japanese architecture, one set of sliding doors is used for weather protection, shading and privacy, the interior set is used for wind protection and security.



Pocket Sliding Doors

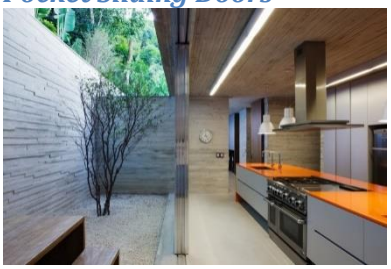
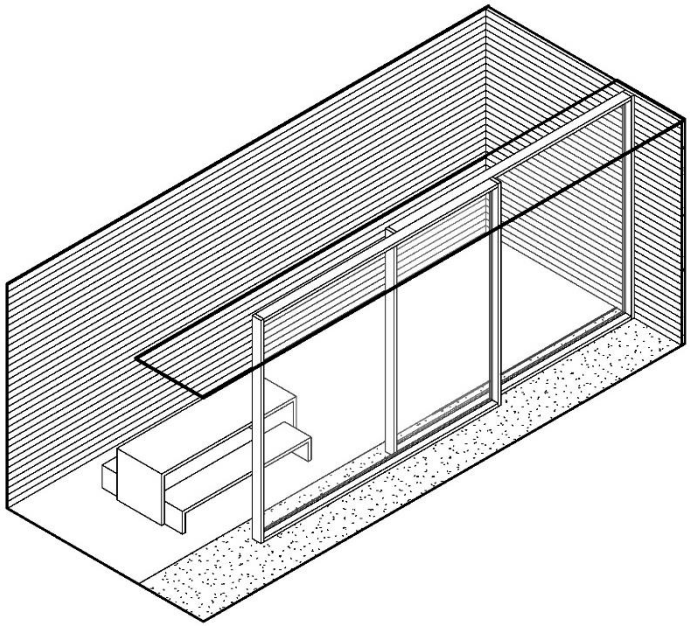


Fig. 203. Marcio Kogan, *Paratay House.* 2009, Paratay, Brazil.

Large pane sliding glass doors on tracks in the ceiling and floor can be pulled away into pockets in the wall to be completely out of the way. This joins interior and exterior spaces seamlessly when opened and allows views and weather protection when closed.

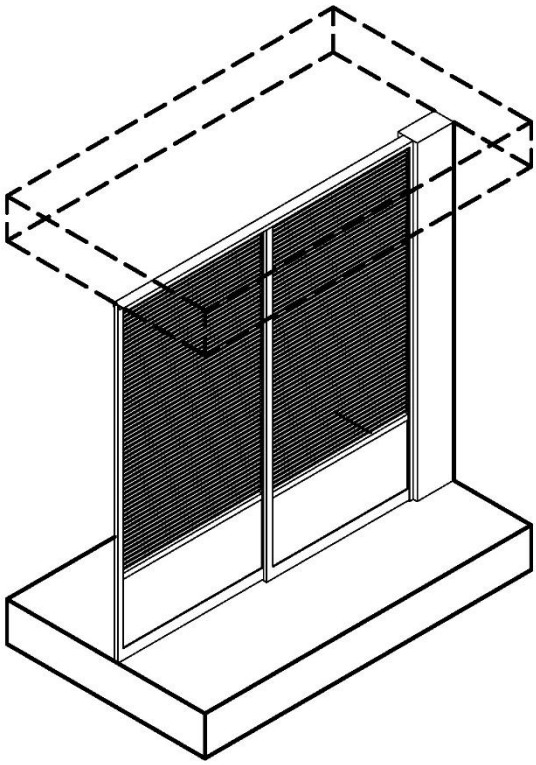


Ventilated

Louvered Sliding Doors with Hip Boards

Fig. 204. Vladimir Ossipoff, Diamond Head Residence. 1963, Hawai'i.

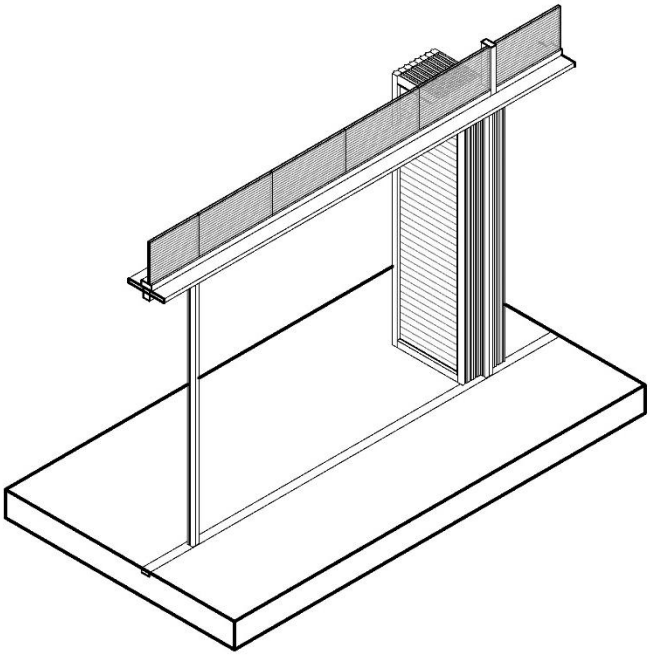
These doors are ventilated with small fixed wood louvers and also feature a hip board panel at their base.



Louvered Folding Doors

Fig. 205. Bijoy Jian, *Palmyra House*. 2007, Nandgaon, Maharashtra, India.

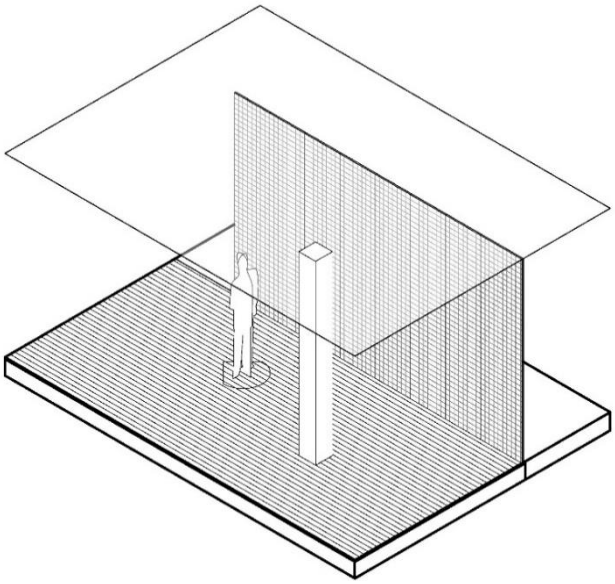
These are tri-folding doors with operable wood louvers for ventilation.



Mashrabiyas

Fig. 206. Marcio Kogan, *Bahia House*. 2010, Bahia, Brazil.

Mashrabiyas were brought to Brazil by the Portuguese from Arabia and are carved wood panels or frames with wood lattice work infills that allow ventilation and shading, but can also be folded away.

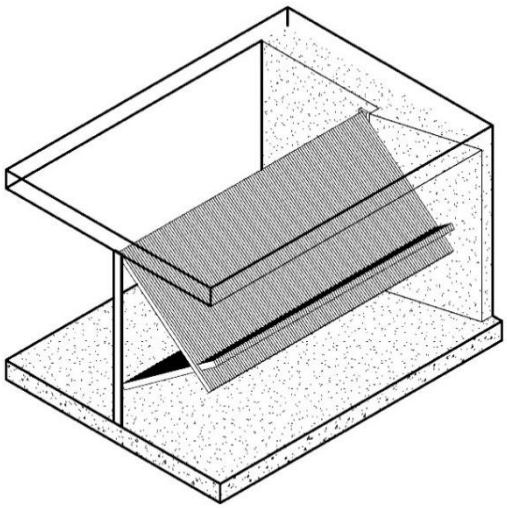


Pivot

Horizontal Pivot Door

Fig. 207. Craig Steely, *Peter's House*. 2013, San Francisco, California.

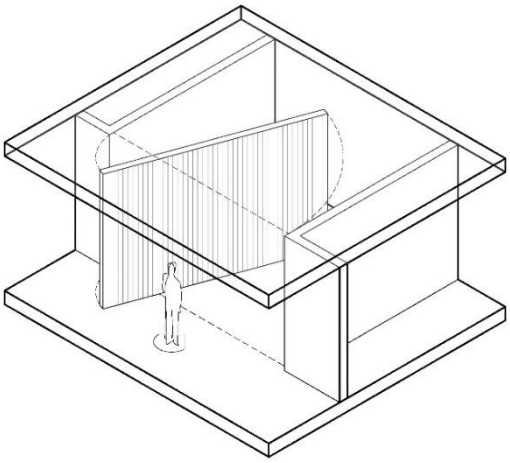
This garage door articulates in the middle where wood members cross over each other making a solid surface when closed but an overlapping pattern when opening upward.



Pivot Door

Fig. 208. Marcio Kogan, *Rocas House*. 2013, Chile.

A large panel is pivoted from ceiling to floor in the center allowing the whole wall to be swung open.



Folding

Bi-fold Doors

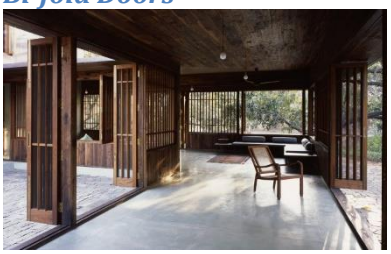
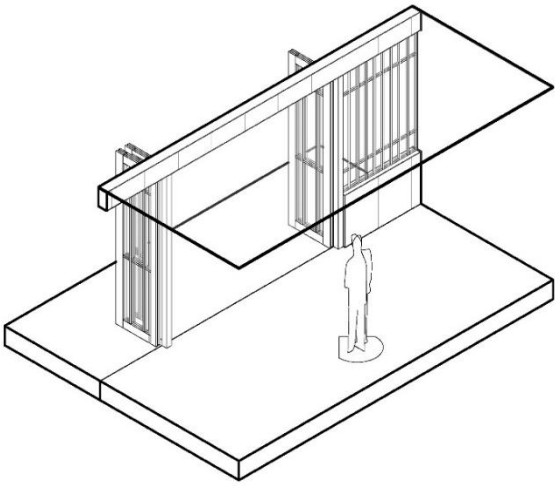


Fig. 209. Bijoy Jian, *Copper House II*. Chondi, Maharashtra, India.

Bi-fold doors with wood lattice that can be folded away to open, or folded closed to shade and secure the interior while still allowing ventilation.



Folding Lattice Doors

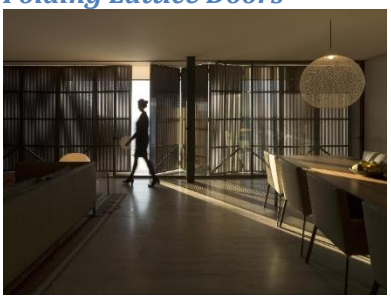
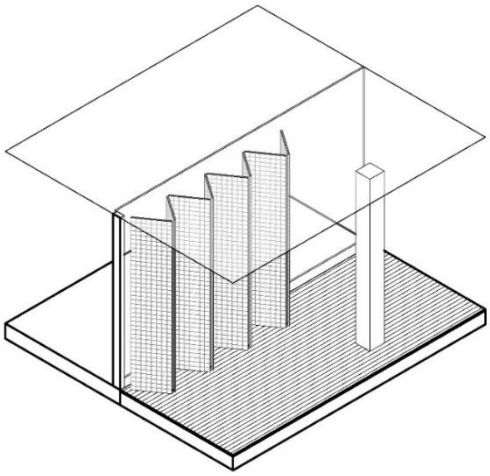


Fig. 210. Marcio Kogan, *Rocas House*. 2013, Chile.

Small lattice work doors provide shading and privacy in large open spans.



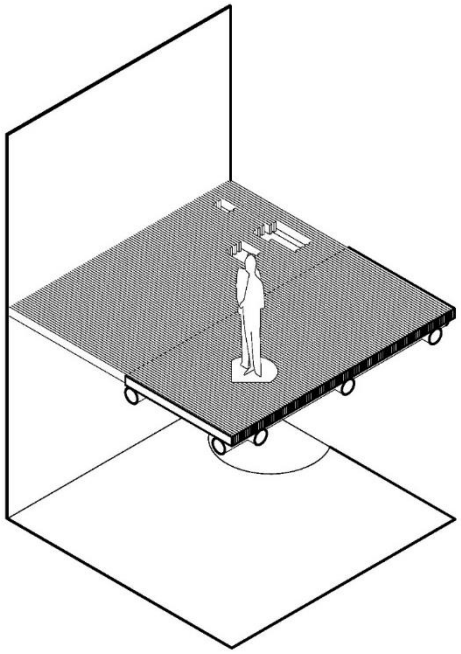
Floors

Ventilated

Lattice Floor

Fig. 211. A21 Studio, *a21 house*. 2012, Vietnam.

Wood slats create an interior decking that allows air and light to move through the multi-story space. Tighter distances between slats create paths and wider distances create light wells and areas for trees to grow through the different stories.

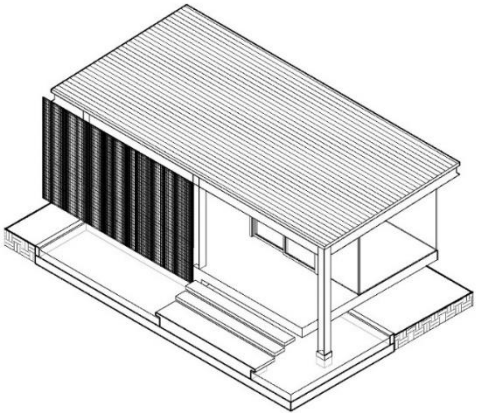


Elevated

Elevated above Water

Fig. 212. Craig Steely, *Lava Flow 5*. 2013, Hamakua coast, Hawai'i.

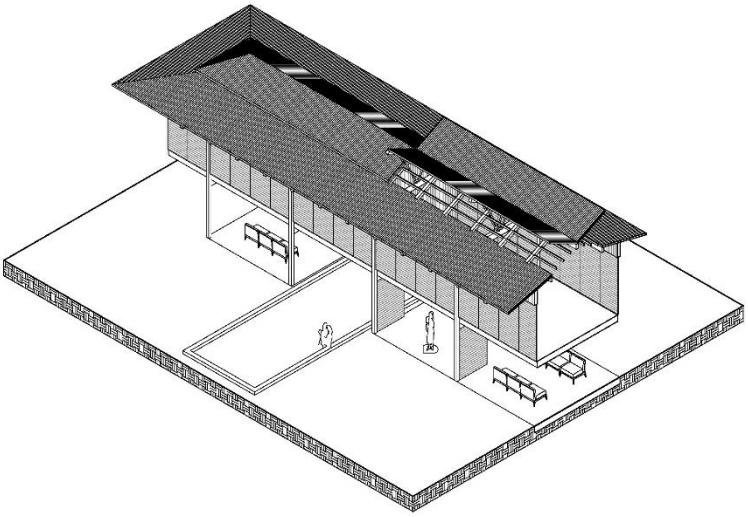
The concrete floor slab is cantilevered above a pond.



Elevated above Living Space

Figure 213. Tom Kundig, Hawai'i Residence. Hawai'i.

The main rooms of the house are on the second story leaving the first story relatively exposed and open for other activities like lounging and entertaining. Also protects living areas in flood zones.



Elevated above Car Port

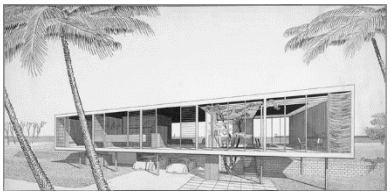
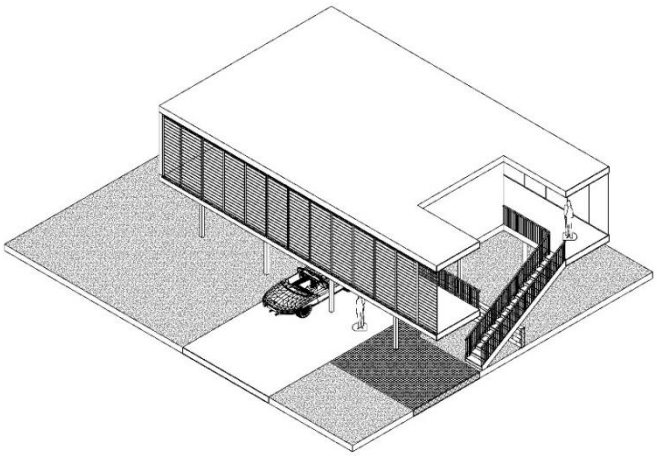


Fig. 214. Paul Rudolph, Walker Guest House. 1952, Sanibel Island, Florida.

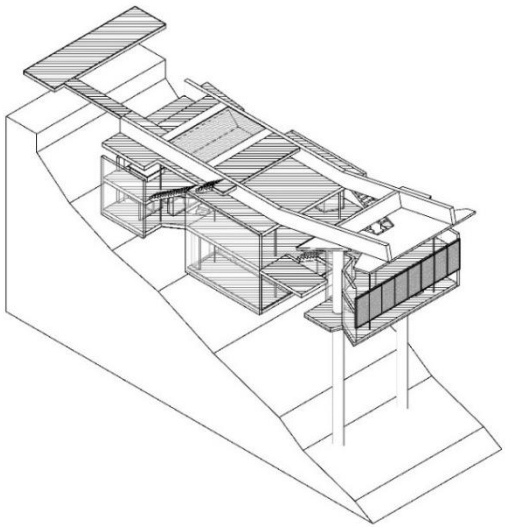
The main rooms of the house are on the second story leaving the first story relatively exposed and open for a car port. Also protects living areas in flood zones.



Multi-level Elevated Floor

Fig. 215. Angelo Bucci, *House in Ubatuba*. 2005-09, Brazil.

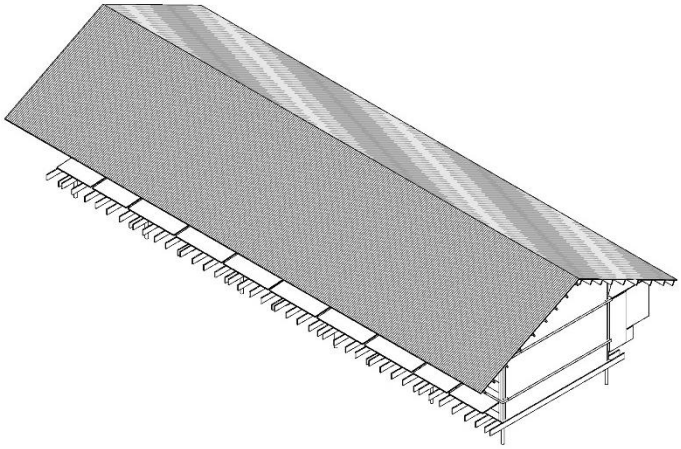
On a sloped site, minimal ground work was done by elevating all the floors higher to the height of the top plane. Floors then step down with the site but never touch the ground.



Elevated Pavilion

Fig. 216. Glenn Murcutt, *Marika-Alderton House*. 1994, Australia.

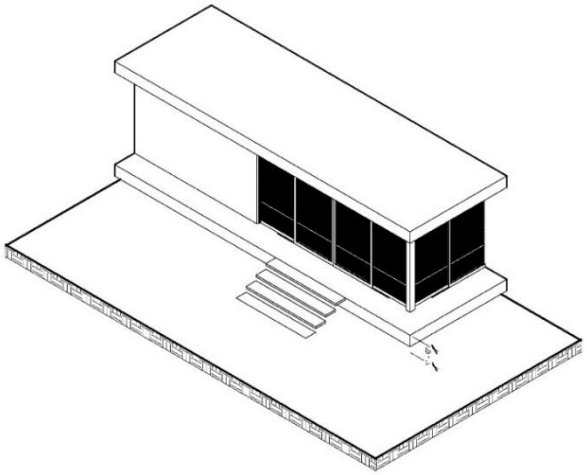
Elevating the floor plane is common in the tropics as the ground is usually wet. This also means less disturbance to the site and water runoff. Also breezes beneath the building help cool it in the summer.



Low Elevated Floor

Fig. 217. Vladimir Ossipoff, *Blanche-Hill House*. 1961, Kāhala, Hawai'i.

This elevated floor protects the main living space from flood zones but also is close enough to connect the interior space with the lawn.



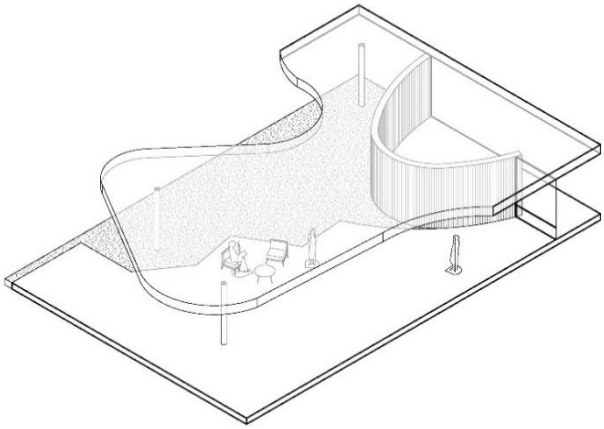
Outdoor Rooms

Wall-less Room

Roofed Space

Fig 218. Oscar Niemeyer, *Canoas House*. 1952, Rio de Janeiro, Brazil.

This outdoor room is only defined by the roof above and the ground plane.



Spill-Out Covered Space

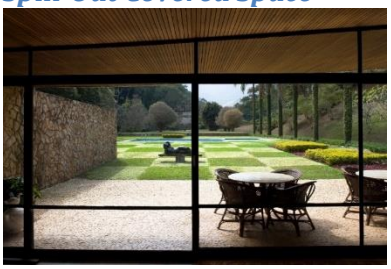
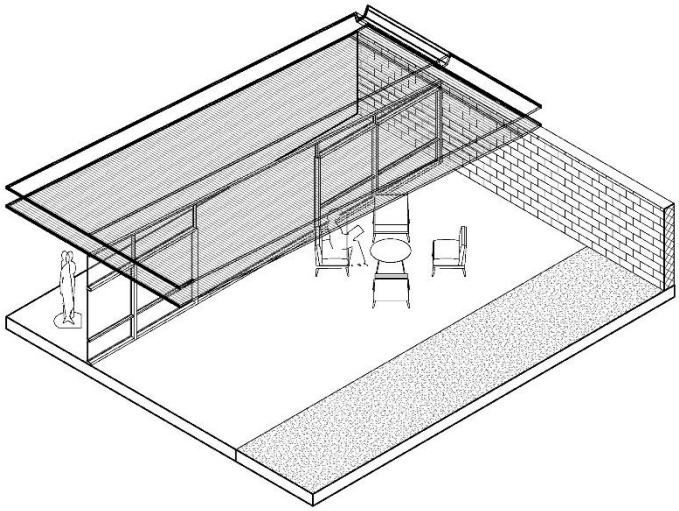


Fig. 219. Oscar Niemeyer, Cavanelas House. 1954, Pedro do Rio.

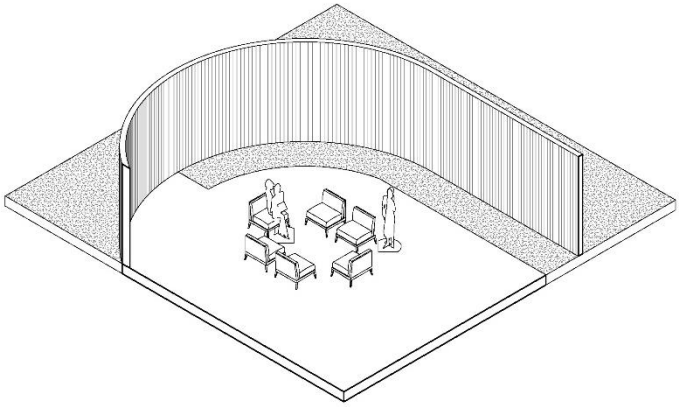
The roof is extended far beyond the exterior glass wall to cover a space that servers as an extension to the interior space.



Roofless Space

Fig. 220. Richard Neutra, *Von Sternberg House*. 1935, Los Angeles, California.

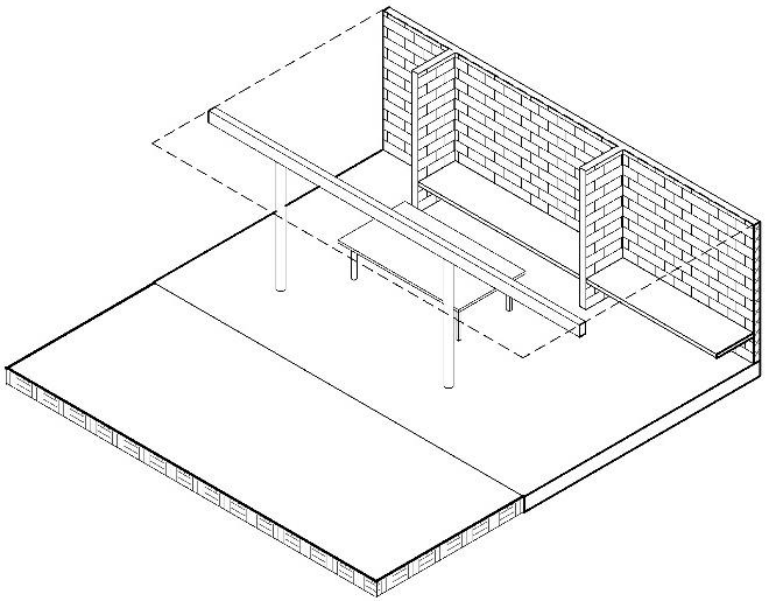
The high fence around this patio define a secluded private space while leaving it open to the sky above.



Lanai

Fig. 221. Vladimir Ossipoff, *Liljestrand Residence Lanai*. 1952, Hawai'i.

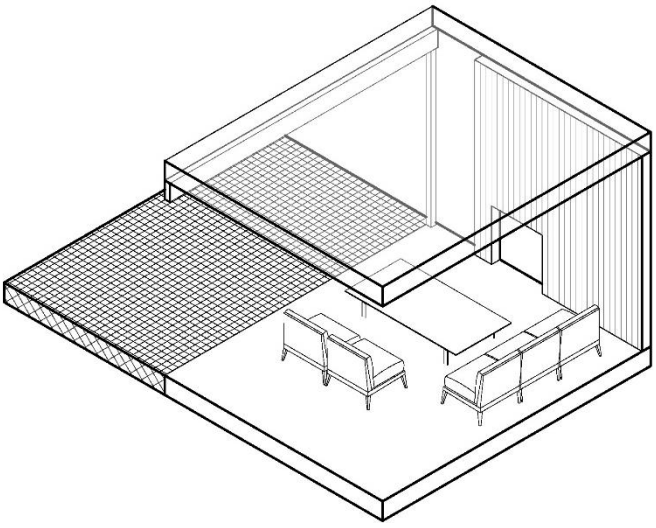
An open to the elements living space that is covered on a most three sides and a roof above. Originated from Hawaiian traditional architecture of a thatched roof on posts, open on all sides as a protection from the sun, but open to wind and views. Furnished today like a normal living room.



Spill-Out Space

Fig. 222. Richard Neutra, *Nesbitt House*. 1942, Los Angles, California.

The roof is extended beyond the exterior threshold to cover a space that servers as an extension to the interior space, however there is no means of enclosure and the room is always without one wall.



Continuous Space

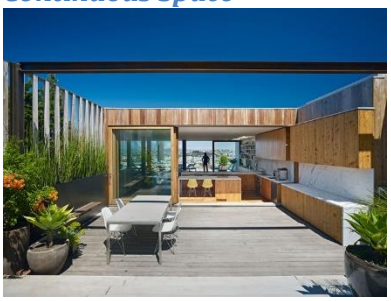
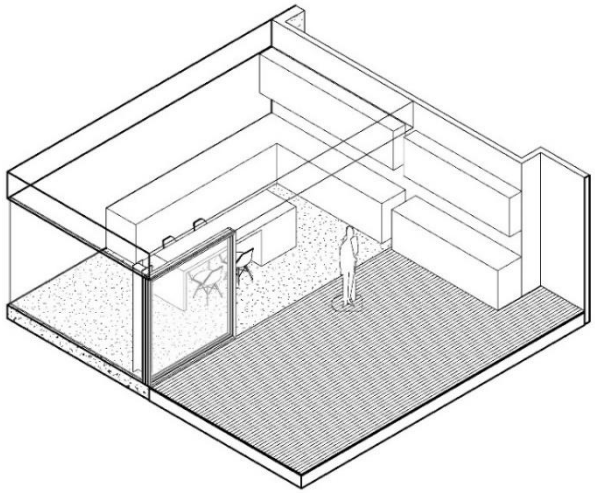


Fig. 223. Craig Steely, *Peter's House*. 2013, San Francisco, California.

Glass walls that divide the kitchen space from the outside cooking space can be removed making one continuous space.



Non-Enclosed Space

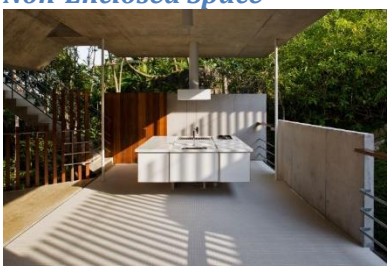
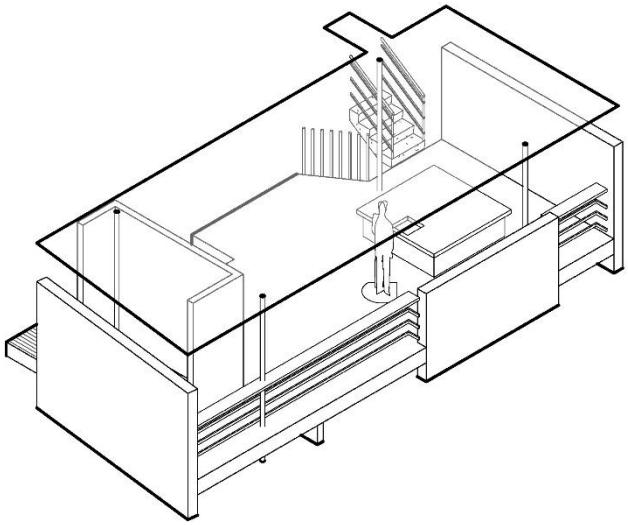


Fig. 224. Angelo Bucci, *House in Ubatuba*. 2005-09, Brazil.

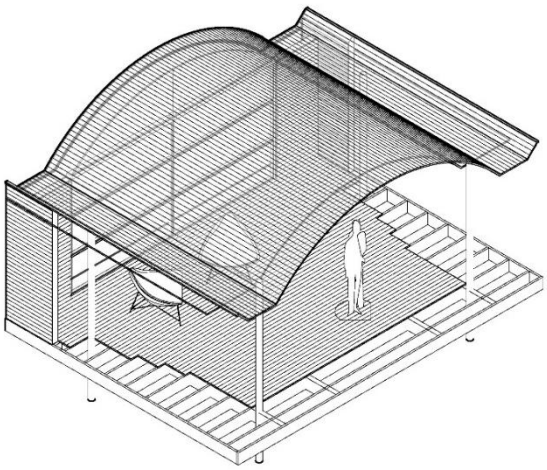
An everyday living space with no means to enclose or secure the room from the elements other than a roof, overhangs and half-height walls.



Wall-less Room

Fig. 225. Glenn Murcutt, *Ball-Eastaway House*. 1980-83, Australia.

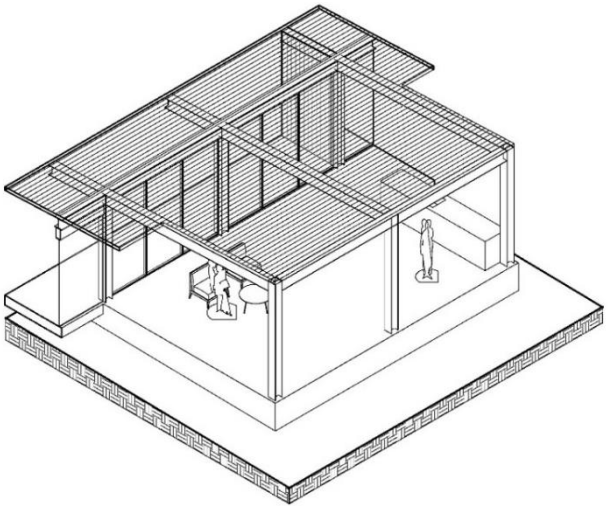
A room that is under the main roof of the house and is of the same overarching volume, but has no walls on three sides, opening it to the elements.



Wall-less Room

Fig. 226. Craig Steely, *Lava Flow 5*. 2013, Hamakua coast, Hawai'i.

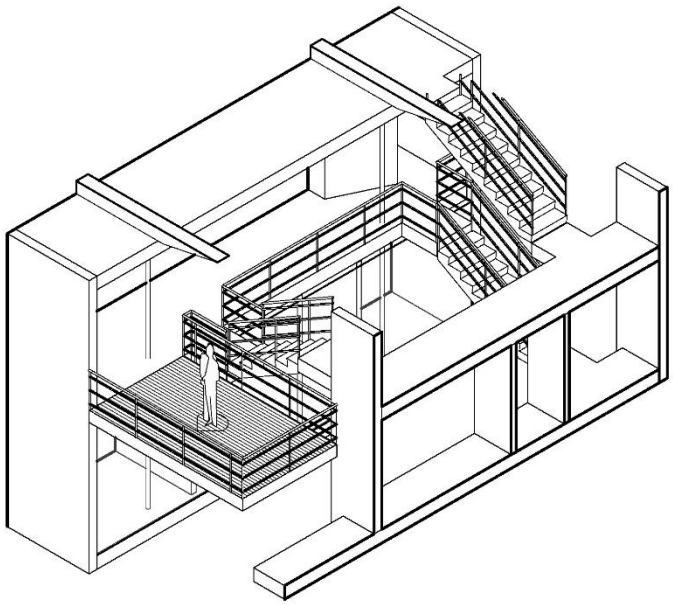
A room that is under the main roof of the house and is of the same overarching volume, but has no walls on three sides, opening it to the elements.



Wall-less Room

Fig. 227. Angelo Bucci, *House in Ubatuba*. 2005-09, Brazil.

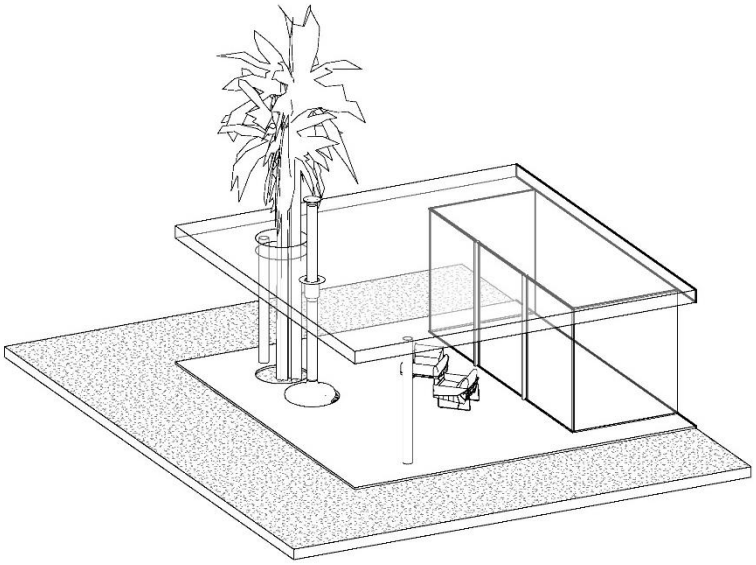
This wall-less room is the main vertical circulation for the house and is only partially covered by a roof, however is loosely defined by two walls.



Wall-less Room

Fig. 228. Marcio Kogan, *Toblerone House*. 2011, São Paulo, Brazil.

A room that is under the main roof of the house and is of the same overarching volume, but has no walls on three sides, opening it to the elements.

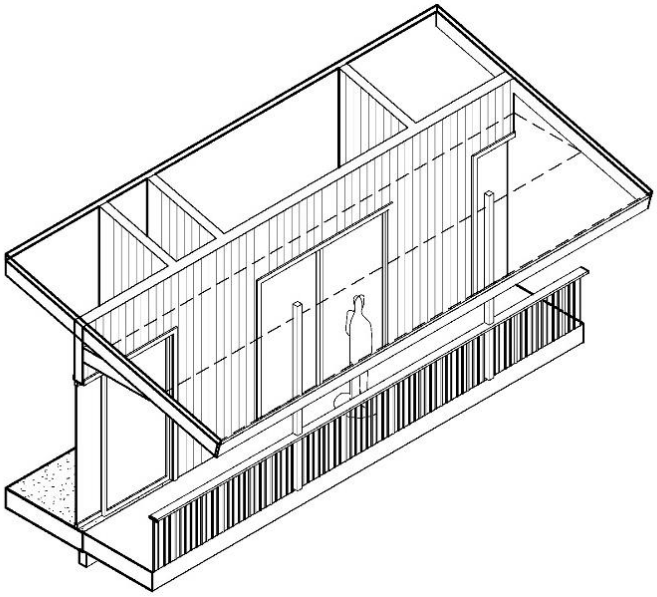


Engawa

Engawa

Fig. 229. Vladimir Ossipoff, *Liljestrand Residence*. 1952, Hawai'i.

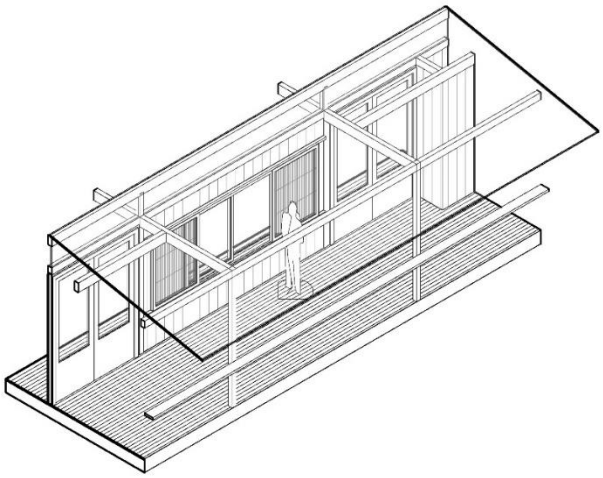
An exterior circulation space that serves as both pathway, viewpoint, and threshold between interior rooms and the elements.



Engawa

Fig. 230. Richard Leplastrier, Rainforest House. 1988-91, Australia.

An exterior circulation space that serves as both pathway, viewpoint, and threshold between interior rooms and the elements.

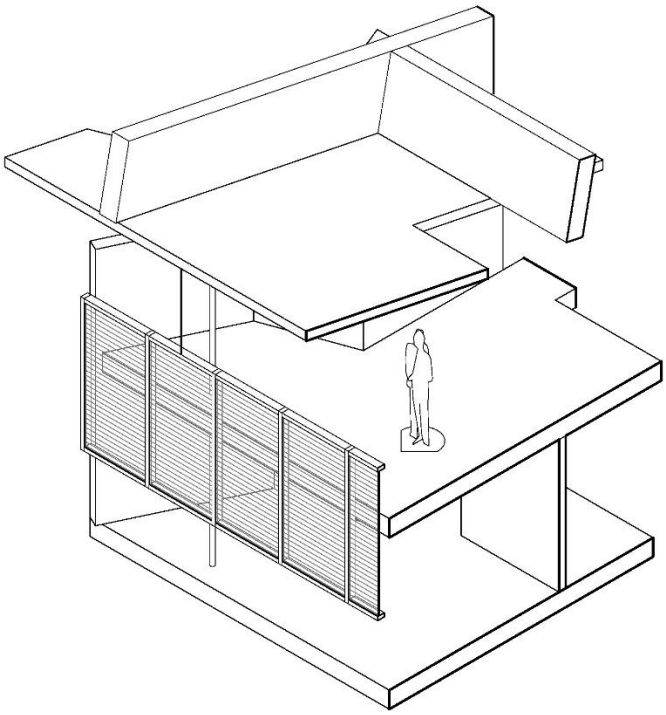


Balcony

Enclosable Balcony

Fig. 231. Angelo Bucci, *House in Ubatuba*. 2005-09, Brazil.

A second floor space that is defined by a roof and has one wall that can be opened up to the elements.



Nature

Pool

Rooftop Pool

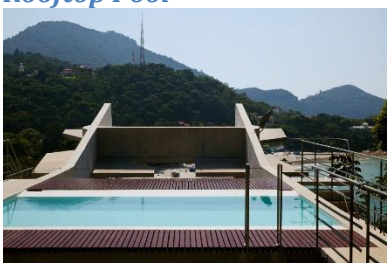
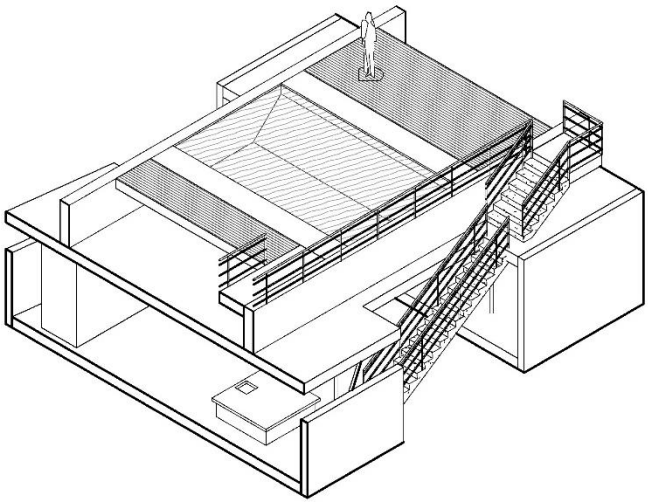


Fig. 232. Angelo Bucci, *House in Ubatuba*. 2005-09, Ubatuba, SP, Brazil.

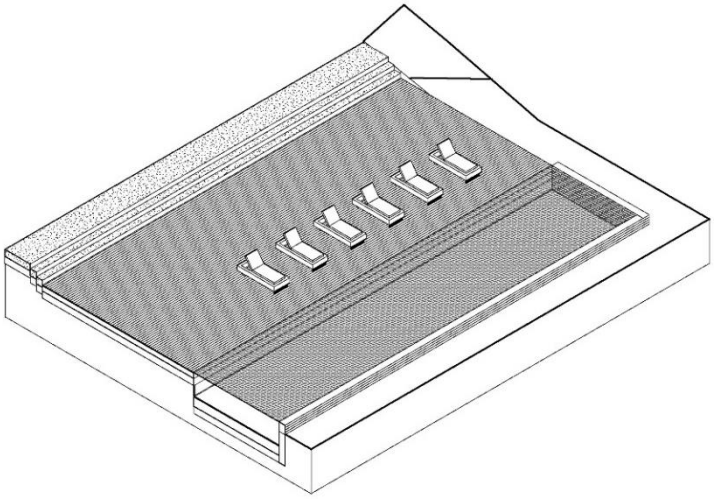
A large, cast-in-place concrete channel with enclosed ends holds a lap pool on the roof top, three stories above ground, of this house.



Infinity Edge Pool

Fig. 233. Marcio Kogan, *Paratay House.* 2009, Paratay, Brazil.

The far edge of the pool disappears into the water connecting the water of the pool visually to the ocean beyond.



Natural Edge Pool

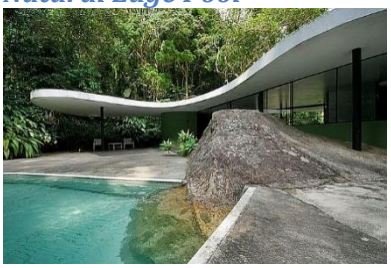
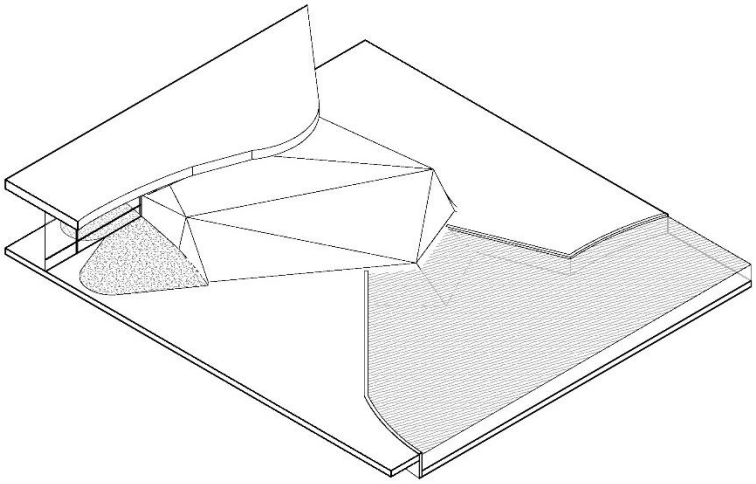


Fig. 234. Oscar Niemeyer, *Canoas House*. 1952, Brazil.

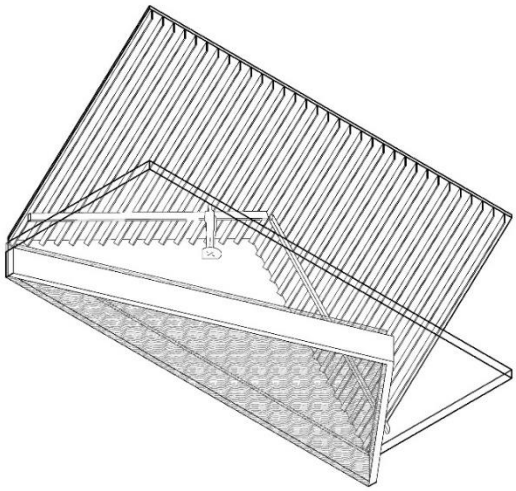
Using a natural rock outcropping on the site, as well as slopping and organically shaped edges, the ground plane slips into the pool like a pond.



Covered Pool

Fig. 235. A21 Studio, *Tent II*. 2014, Nha Trang, Vietnam.

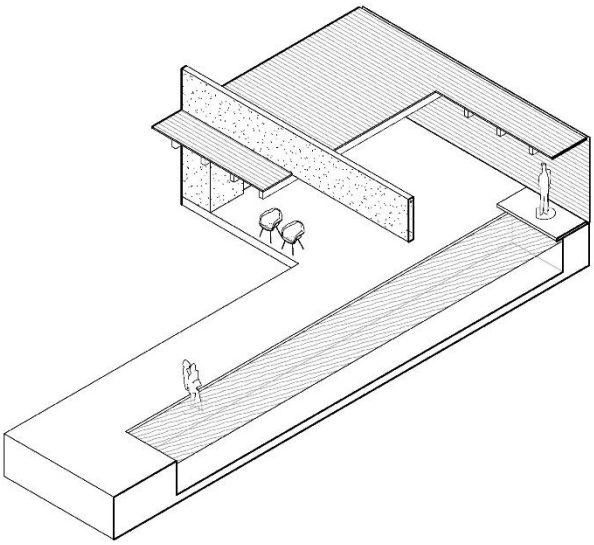
This pool is under the main roof of the house which has been pulled up to allow an opening to the view beyond, once inside the pool.



Rectilinear Pool

Figure 236. Craig Steely, *Lava Flow 7*. 2013, Big Island, Hawai'i.

This pool has a bridge over it and serves as a barrier between different areas of the house, as well as being of the same language as the rest of the structure.

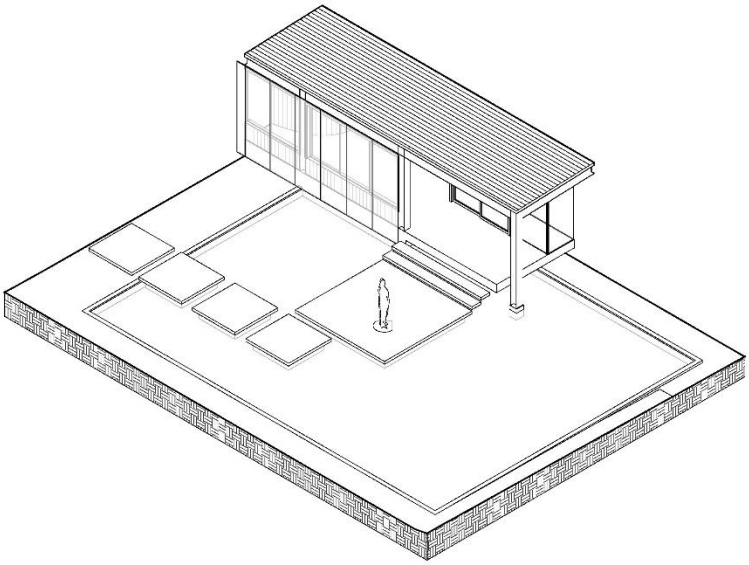


Pond

Vegetated Pond

Fig. 237. Craig Steely, *Lava Flow 5*. 2013, Hamakua coast, Hawai'i.

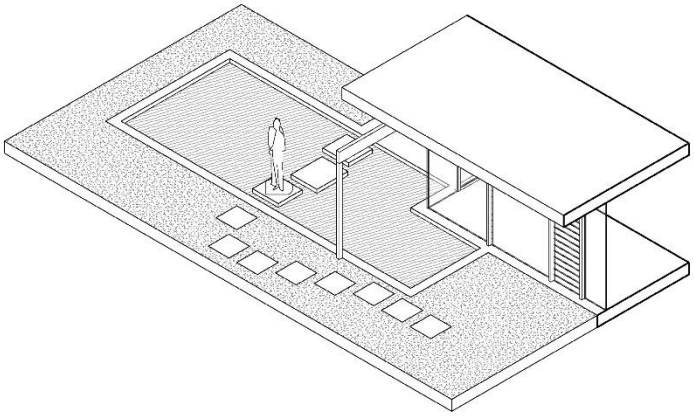
Bodies of water work to increase the humidity and cool breezes before entering the house. This one has concrete pavers that provide an edge to shelter the fish from the sun.



Shallow Pond

Fig. 238. Richard Neutra, *Singleton House*. 1959, Los Angeles, California.

Ponds and bodies of water are good in increasing the humidity and cooling breezes before they enter the house. This one has concrete pavers that serve as the entry to the house.



Rooftop Pond

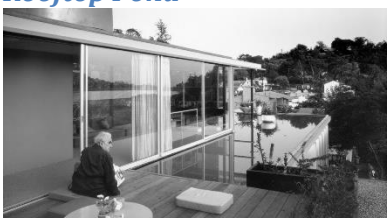
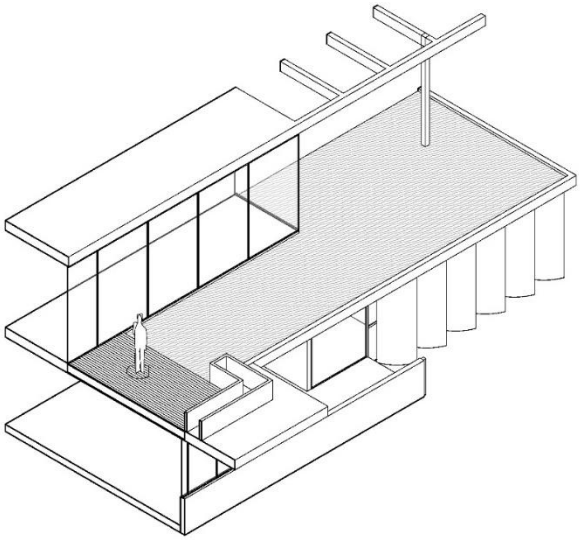


Fig. 239. Richard Neutra, *VDL Research House II*. 1964, California.

This flat roof has a pond that works as thermal mass to increases insulation during the day as well as radiate during cool nights. The pond also helps cool breezes entering the house.



Courtyard Pond

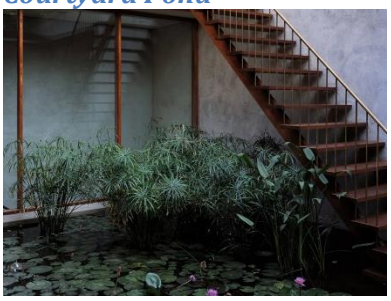
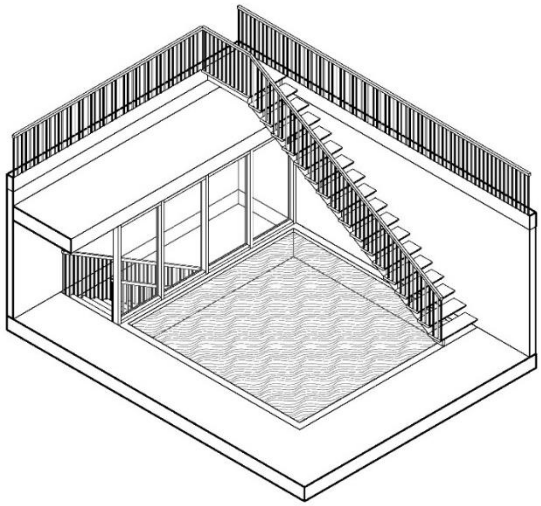


Fig. 240. Bijoy Jian, *House on Pali Hill*. 2012, Bandra, Maharashtra, India.

This vegetated pond is the entire space of this courtyard, giving nature and cool air to the interior of this house.



Interior Reflecting Pool

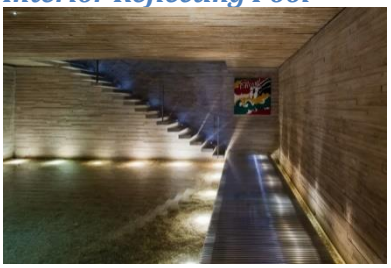
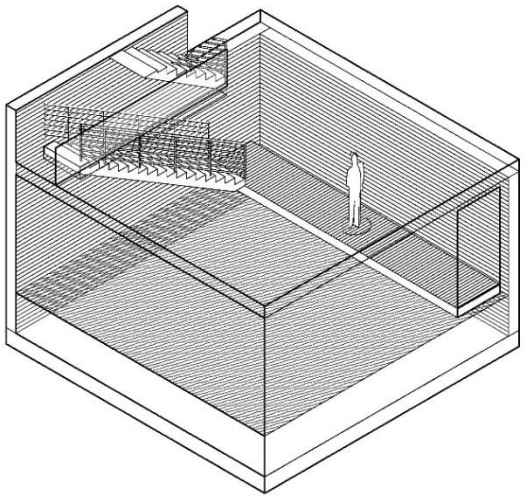


Fig. 241. Marcio Kogan, *Paratay House.* 2009, Paratay, Brazil.

This interior pond serves as a dramatic entrance to the house as people have to walk across a bridge that spans the length of the pond.

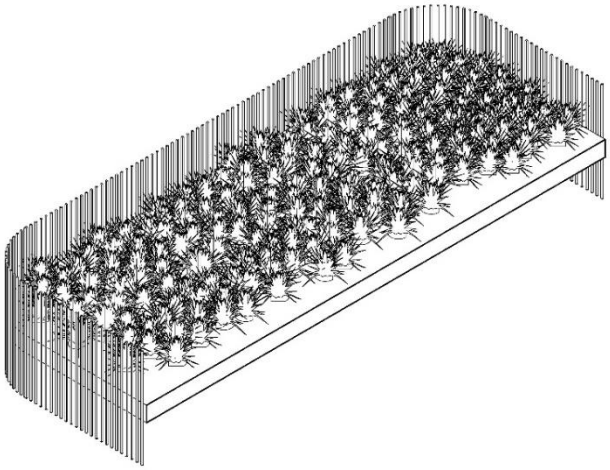


Garden

Rooftop Garden

Fig. 242. Vo Trong Nghia, *Green Renovation*. 2013, Vietnam.

This rooftop garden allows for an oasis as well as can be used to grow herbs and fruit to be harvested at home.



Planters

Roof Penetrating Planter

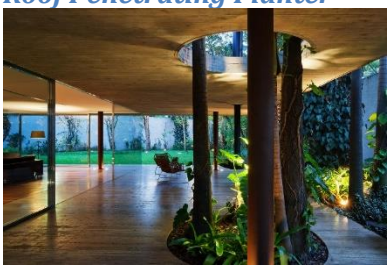
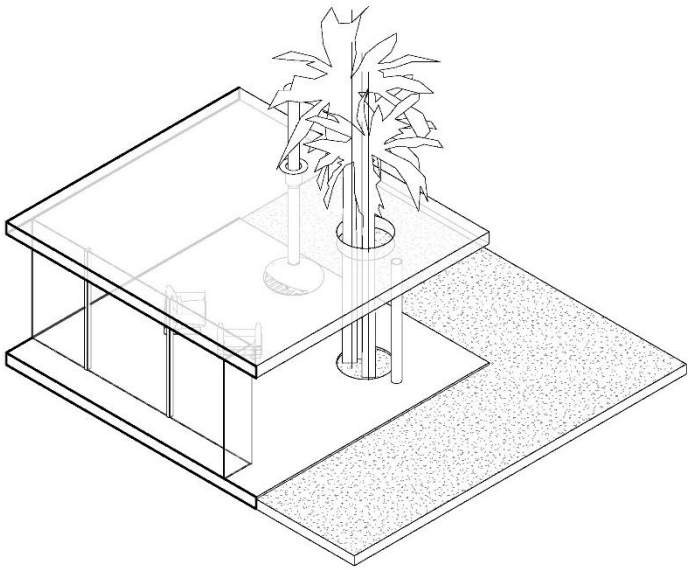


Fig. 243. Marcio Kogan, *Toblerone House*. 2011, São Paulo, Brazil.

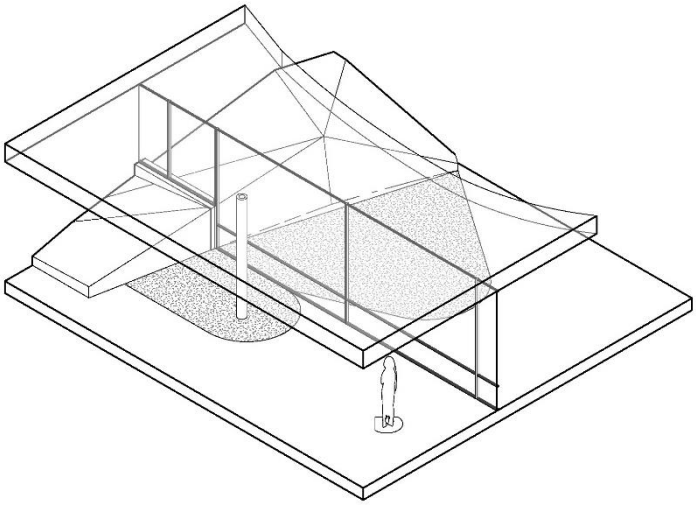
The planter below this roof is allowed to be planted with trees as there is an opening in the roof of the same size which allows trees like palms to penetrate through the building.



Blurred Edges

Fig. 244. Oscar Niemeyer. 1958, Canoas, Brazil.

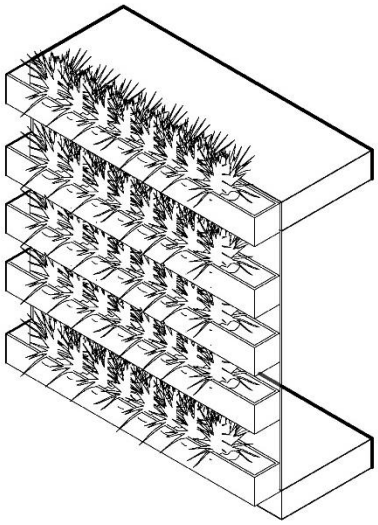
This planter and rock outcropping goes through the wall, from interior to exterior and helps to ease the transition from in to out.



Stacked Planters

Fig. 245 - Vo Trong Nghia, *Stacking Green*. 2011, Saigon, Vietnam.

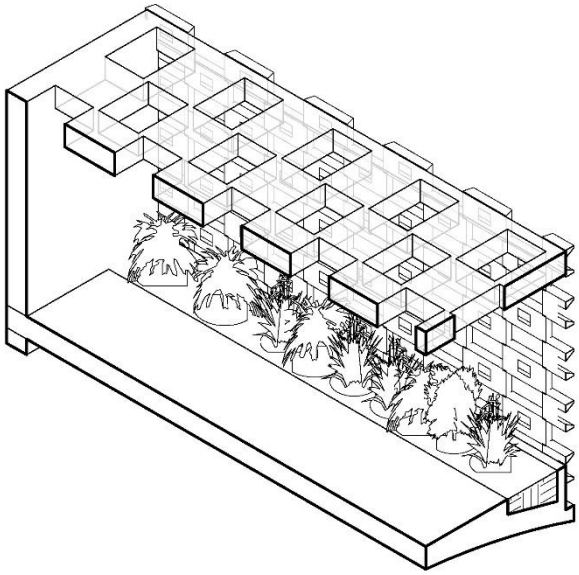
Shelves of planters cover the outside of the house and are filled with short growing plants that serve as the privacy screen and shading device for the interior.



Semi-Enclosed Planter

Fig. 246. Vo Trong Nghia, *Binh Thanh House*. 2013, Vietnam.

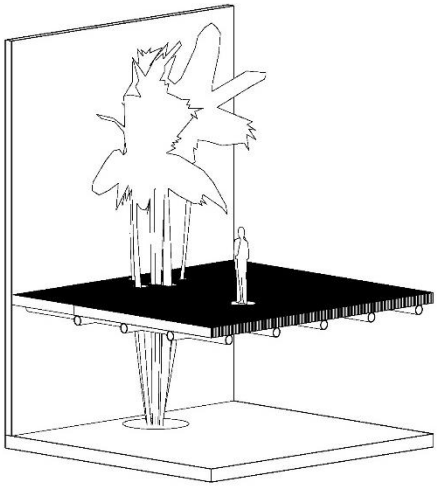
This space has a ventilated wall and ceiling allowing air and sun to come inside, the planter on the outside helps to buffer the space between interior and edge as well as bring life to the space.



Enclosed Planter

Fig. 247. A21 Studio, *a21 house*. 2012, Vietnam.

A planter at the ground floor has trees growing from it that penetrate through the two floors above into the light well.



Furniture

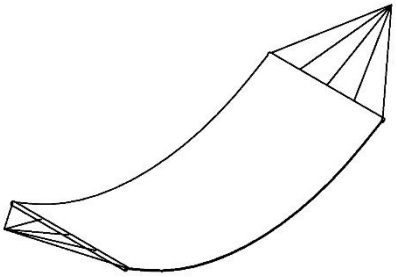
Modernists have long always designed their furnishings in their designs as a part of total design idea. However, there are more functional reasons to design special furniture in the tropics than other parts of the world. In majority, houses in the tropics are minimally furnished, sharing aspects of Japanese cultural design, but those pieces that do remain are designed to adapt to the climate. Through the use of materials, construction and ergonomics, chairs and lounges are designed to ventilate and deal with moisture and humidity. This collection of furniture vocabulary are a combination of either vernacular tropical furniture, modern furniture, or specifically tropical modern furniture.

Lounge

Hammock

Figure 248. Cropped from: Craig Steely, *Lava Flow 2*. 2009, Hawai'i.

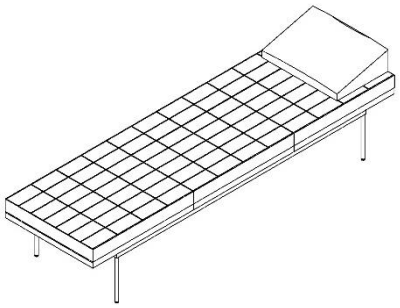
The hammock combines comfort, movement and ventilation.



Daybed

Fig. 249. Richard Stein, *Daybed Sofa*. 1946, Wood frame, latex mattress.

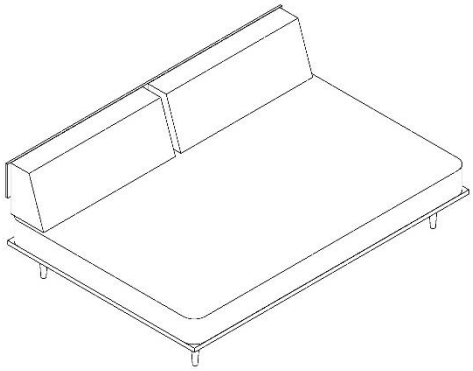
A platform bed with a ventilated frame allows air to cool the mattress.



Pune'e

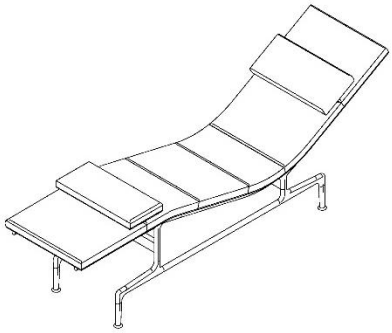
Fig. 250. Vladimir Ossipoff, *Liljestrand Residence*. 1952, Hawai'i.

The Hawaiian daybed.



Chaise Lounge

Fig. 251. Poul Kjaerholm, *PK24 chaise lounge*. 1965/1967, stainless steel, leather, cane.

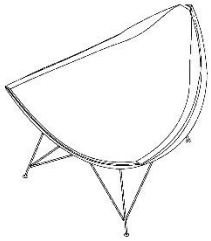


A ventilated outdoor chair good for lounging and tanning. Also a common typology redesigned by modernist furniture designers.

Seating

Fabric Chair

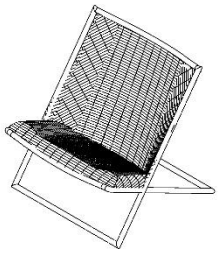
Fig. 252. Antonio Bonet, Jorge Ferrari Hardoy, Juan Kurchan, *B.K.F. Chair*. 1938, Wrought iron rod, paint, and leather.



The fabric is lightweight, breathable, and washable.

Cane and Metal Chair

Fig. 253. Poul Kjaerholm, *Triennale Chair*. 1956, Chrome-plated steel and cane.



Uses local materials to make a breathable covering.

Wicker and Metal Chair

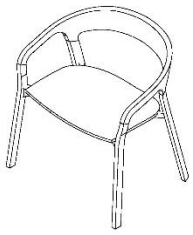
Fig. 254. Twitchell with Rudolph, Cocoon House. 1950, Florida.

Uses local materials to make a breathable covering.

Wood Chair

Fig. 255. Hans Wegner, *Cowhorn Chair*. 1952, Walnut and cane.

Local woods are handcrafted to show local character and nature.



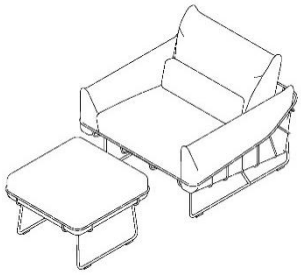
Eames Chairs

Fig. 256. Eames, *Low Side Chair*. 1946, Molded and bent plywood.

Charles and Ray Eames designed a series of chairs that are now synonymous with modern architecture.

Lounge Chair

Fig. 257. Grete Jalk, *Lounge Chair*. 1963, Molded laminated teak.

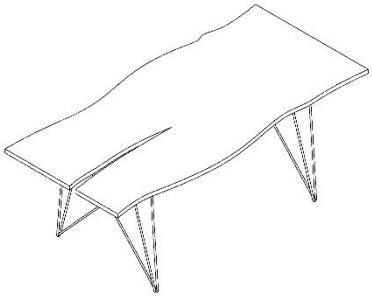


Lower to the ground and occasionally paired with a matching ottoman, they are designed to relax and enjoy the scenery.

Tables

Natural Edge

Fig. 258. George Nakashima, *Conoid Bench*. 1977, walnut and hickory.



Large slabs of local wood are finished to show the natural edge of the tree and given minimal legs to support them.

Noguchi-Esque

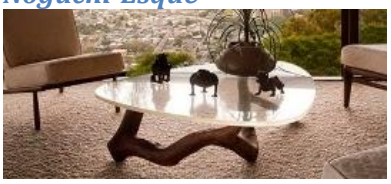
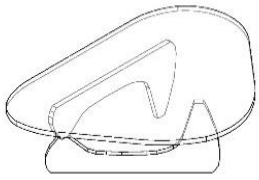


Fig. 259. Vladimir Ossipoff, *Liljestrand Residence*. 1952, Hawai'i.



Either a true Noguchi coffee table or inspired by it, artistic legs hold up an organically shaped glass top.

Syntax of Tropical Modernism

Previously, when discussing the concept of a vocabulary of a Tropical Modern design language, we used the example of the indoor-outdoor space – more directly referencing the engawa of Japanese architecture. If we look at the engawa again with the diagrams represented in the previous section, we can see how one 'word' has different meanings – or rather, it was used differently in different sentences giving it a different meaning.

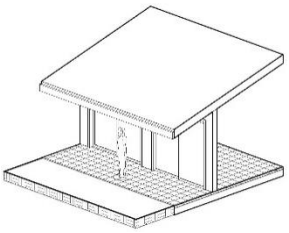


Fig. 260. Vladimir Ossipoff, *Goodsill Residence*.

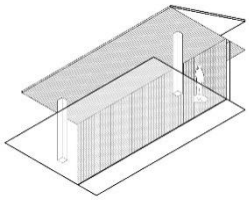


Fig. 261. Marcio Kogan, *Bahia House*.

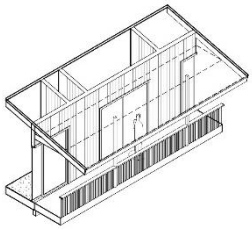


Fig. 262. Vladimir Ossipoff, *Liljestrand Residence*.

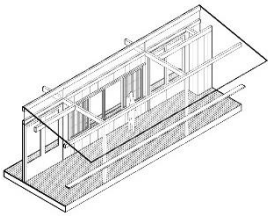


Fig. 263. Richard Leplastrier, *Rainforest House*.

Traditionally the engawa was the covered exterior circulation space on a one story Japanese house. The meaning of engawa is to "join side," not just in creating circulation but joining the inside with the outside. If that is its function – connection – it could be left with just that one meaning and definition. But from the four examples called out (Fig. 260 - Fig. 263), all which by definition are called engawa, none of them are in Japan, and there are slight variations to them that make them take on second meanings. This difference is formed by the sentence structure and accompanying words in the sentence. In the traditional engawa, accompanying words are elements like sliding shoji doors, wood decking, and a low elevated floor that gave a small separation between the ground and the walking surface. Here, in these examples, there are similar accompanying words which help to describe the engawa, but are different enough to give it a second meaning.

Fig. 264. Vladmir Ossipoff, *Goodsill House*. 1952, Waiʻalae, Honolulu, Hawaiʻi.

For example, in Fig. 260 and Fig. 264, Ossipoff designed this main circulation space to connect the front entry with the main living space of the Goodsill Residence. There are the typical sliding doors that connect interior rooms onto the engawa, but they aren't typical shoji panels. They are floor to ceiling glass sliding doors framed in redwood, which have a similar character as the shoji, but allow a clear visual connection between in and out. Using the engawa means that he is providing a covered exterior circulation space, but there are many different ways to do that. Using the engawa already connects it to a cultural reference that is connected to Japanese traditional architecture.

Japanese culture has meaning to both Ossipoff and to Hawai'i. Ossipoff was raised in Japan and much of his architecture is proof of this upbringing. There is also a large Japanese population in Hawai'i, and from that, many examples of Japanese architecture and culture exist on the islands. Many of the carpenters that Ossipoff employed were Japanese immigrants who brought their wood working skills with them to Hawai'i. However to create a Japanese house, so using the engawa and shoji would be overly referential, or too literal. He wanted to give a cultural reference to Japanese architecture, not make a representation of Japanese architecture. Ossipoff did famously state that the Japanese house was better suited to Hawai'i climatically than Japan.[199] In this case, using the engawa was sufficient in giving this reference. He then continues to depart from the engawa typology by creating the engawa level with ground. This engawa wraps around an interior garden, much in the same way as traditional engawa do, but there is no step between wood deck and manicured garden.

In Japanese homes, this level change was essential to keeping the floor clean. Muddy, dirty shoes and sandals were left on this step when entering the house denoted by custom. The level change also disconnected the engawa from the ground enough that dirt and mud wouldn't be blown in, or wouldn't be accidently tracked in by people walking. Here, in the Ossipoff example, the levels are the same, but Ossipoff still obtains the same disconnect by not planting grass at the edge and instead having short plants that create a barrier that people wouldn't want to walk through. Instead of a stone step down to the garden marking the prescribed path, a clearing in the plants marks the entrance.

Functionally, Ossipoff achieved the same experience as the elevated floor of the engawa, while simultaneously continuing to blur the boundary between architecture space and natural space. In a further study of the floor of the engawa, Ossipoff uses another element to change the meaning – ceramic tile. Traditional Japanese engawa floors are wood decking. Ceramic tile is typical of Spanish vernacular architecture, and used in their courtyards and exterior spaces. It works well as an exterior flooring material. Spanish vernacular architecture has some mention in Hawai'i, as the Mission architecture of Hawai'i's history was designed in its style. So by using ceramic tile on the floor of his engawa, Ossipoff creates another cultural reference to the mission architecture of Hawai'i. The tile is also not just used exclusively in this space, he uses it in the interior of the home as a way to further connect the interior covered spaces with the exterior.

So Ossipoff's sentence that talks about the engawa, doesn't just say 'engawa.' It talks about the Japanese reference in the engawa – it talks about the Mission architecture in Hawai'i through the ceramic tile – it says Modern with the sliding glass doors – it talks about the connection between indoors and outdoors – it also talks about the circulation space of the house – and it talks about the nature of the site, as it helps enclose the interior garden. One space talks about all of those different things. The space is the sentence of the design language. Each element is one of the words within that sentence, but by placing the words in a certain hierarchy, Ossipoff clearly explains what he is trying to articulate. First, he is talking about the engawa – the Japanese space in traditional homes. Second, he is talking about the connection between indoors and outdoors. Third, he is talking about the movement and circulation of the house. Then he talks about the other cultural references. One, the historical references of Hawai'i in its mission architecture. The ceramic tile gives a nod to the history of the area. Then the clean lines

[199] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 96

and glass sliding doors give a reference to the fact that at the time, this was a new house – modern, contemporary, and isn't a relic of the past. In effect, this sentence that Ossipoff constructs talks about the context – through time, climate, culture, and environment. In this sentence he gives a certain hierarchy to which elements of the context are most important to this design, but nonetheless, this design is about context.

That is the syntax for Tropical Modernism. The sentence structure is based around factors of the context. The words have references to different contexts, and when used in a certain pattern, order, or hierarchy, help to explain this context.

If we use the other examples of the engawa from the vocabulary list (Fig. 261-Fig. 263), we can see similar sentence constructs. Similar in that they articulate the context, not similar in that they use the same words with the same end result. In fact all of these examples of engawa use very similar words and elements, but through their order talk about their unique sites.

Fig. 265. Marcio Kogan, *Bahia House*. 2010, Bahia, Brazil.

Marcio Kogan's engawa space in his Bahia House speaks to being in Brazil and on that site. Here the level of the floor is at the same elevation of the ground again, but the floor extends another several feet beyond the roof overhang. This is the way that Kogan seeks to further connect the engawa with nature, while also creating enough space for the interior and exterior spaces to breath. The shoji panels are replaced with folding *mashrabiyas*, an element that originated in Arabia, and was brought over by the Portuguese to Brazil.

These folding doors can be completely folded away making one large open space, but while closed, help define this engawa space. That is a similar function to how Japanese engawa work. The shoji panel can be easily damaged as it is made of rice paper. If it were to be on the outward most edge of the house with no overhang, and no engawa, it would damage from the weather. Shoji do work well to help create private space, diffuse light, and block some light wind. The mashrabiyas are very similar. They are not as weather resistant as sliding glass panels and only work to create privacy and diffuse light. The roofing above this engawa is another reference to the Portuguese architecture and history in Brazil. Here, Kogan uses tile roofing, another inherited element of Brazil's past.

Kogan's intention behind the Bahia house was to respond to the vernacular architecture of the area. Portuguese houses that had been adapted with larger interior courtyards that opened themselves up to cooling ventilation while shading comfortable spaces within. He was seeking to do this in a new, modern way. In this sentence then, Kogan was explaining the history of the site through his references to vernacular architecture, Portuguese heritage, as well as creating a home that responded comfortably to the environment. Kogan is not using the engawa as a way to be referential to Japanese architecture, he is using it for its climatic and functional meanings. Japanese references might have been relevant in Hawai'i for Ossipoff, but here, Kogan uses it as an element of Tropical Modern architecture.

Ossipoff's other engawa, in the Liljestrand Residence (Fig. 262 and Fig. 266) is similar to Leplastrier's engawa in his Rainforest House (Fig. 263 and Fig. 267), in that they both are using the word engawa for its cultural references, but second, in the way they depart from the typology to explain something about their site. Both sites are hilly and densely forested. While Leplastrier's house is only one story, and Ossipoff's is two, both of their engawa are significantly removed from the ground. Because of this they both employ railing between post for security, but what this also does is help explain the topography of the site. If the site were flat, and there were a flat floor running parallel over it, that would help emphasize the flatness of the site.

Fig. 266. Vladimir Ossipoff, *Liljestrand Residence*. 1952, Hawai'i.

Fig. 267. Richard Leplastrier, Rainforest House. 1988-91, Australia.

In these two examples, the sites have slopes to them. The flat floor of the house sets in contrast to the site, visually letting people know that the site is not flat. There are different amounts of slope to each site – in the Ossipoff example, the site slopes significantly enough that there can be living space below the engawa. In the Leplastrier example, the site slopes gradually, so while there isn't an inhabitable space below the house, nature is left uninterrupted and allowed to grow under the house within sight. So in these sentences by two different architects on two different sites, they are using the same words, with the same meaning, but because they are explaining two different sites, wind up with two different sentences.

Regional Factors for Sentence Order

The sentence in Tropical Modernism is ordered to describe various aspects of the context and site. These aspects refer to the 'regional factors' set out by Henry Seckel, and have been used as a structural order for this paper. These factors are isolation, material, economic conditions, climate, setting, cultural background, and environmental living. These regional factors for design initially were presented by Seckel for the islands of Hawai'i, but apply broadly to the tropics. They are the contextual factors that come through in the architecture of a region and are elements to describe of the site in Tropical Modernism.

Isolation

Isolation, in Seckel's factors, referred to the isolated state of the Hawaiian Islands in terms of proximity to other land masses – but really meant it as more of a way of connection, rather than isolation. Hawai'i, like most regions of the tropics, is highly connected to the rest of the world. There are many different cultures that have settled there – it was first inhabited by pacific voyagers who used the ocean as a super highway, and even today, it is more so connected with the use of airplanes, technology, and the internet. Isolation in the tropics could mean just the

opposite, it could mean multi-cultural, multi-connected, and integrated. Much of what is available in the rest of the world is also available in 'isolated' regions of the tropics, and at a comparable price. But isolation can also refer to individuality and uniqueness. The regional factor of isolation represents this dichotomy of individual character, and interconnected markets.

How does one construct a design sentence then that represents this dichotomy that is 'isolation'? For this, I will use an example from the work of Glenn Murcutt. Murcutt's most notable work is often built in rural sites, quite literally isolated from civilization, resources, and neighbor. These projects are built in the Australian outback, on large plots of land used for farming or left untouched so that the users can enjoy the splendors of the nature around them.

Fig. 268. Glenn Murcutt, *Marie Short House*. 1974, Kempsey, New South Wales, Australia.

So what does one build with in the Australian outback? Historically, in the pioneering days of Australia, the most economic, durable, workable, and lightest material to bring with you away from civilization into these isolated zones of the outback, was corrugated metal. Even in a time when Australia was still growing its economy and settlements, corrugated metal, a fairly universal industrial building material was what people would build their shelters out of. There was no escaping the interconnectedness of the world, even in isolated parts of Australia – if not especially in these parts. In a way, survival for these new colonizers of the outback rested on the fact that they were in some capacity un-isolated from the rest of the world.

Many years later, Murcutt was faced with the same predicament of what to use for a building material for his rural houses. He came to the same conclusion, but his was based on the traditions of the previous builders. So his work then gave reference to the dichotomy of isolation and interconnection. His houses are isolated, but are not built from the dirt and sticks around them. They are built from an industrial material, brought to the site, like his forefathers did before him. Through the corrugated metal, the prefabricated structure, and the elevated pavilion like shelters, Murcutt composes a sentence explaining isolation, a factor of regional architecture.

Material

Murcutt's use of corrugated metal as a building material represented isolation in his designs, but material can be representational of other things as well. Material, as a regional factor for design, can speak volumes about the place and the site. Using local woods, stones, and other materials found at hand, give an immediate connection to the place. Seckel talked about how in Hawai'i there isn't any one material in abundance that lead itself to a certain regional character. The opposite is true of areas like Japan, where large old forests yielded much lumber for Japanese

carpenters creating a type of architecture that was characterized by its wood craftsmanship. But for islands like Hawai'i, this is a true statement. Sure there are local building materials, but not a surplus of any one kind. Hawaiian traditional architecture was characterized by wood frames, thatched roofs, and lava rock platforms, but even this wasn't a universal trait. The types of wood would change depending on availability in the area. Thatching changed as well to what was plentiful at arm's reach from the site. And lava rock was only used in areas with lava rock already. Lava rock wasn't hauled across the islands for everyday households, perhaps for heiau and religious sites, but when there wasn't any, you made do with what you had. Nonetheless, using local building material in some capacity gives an inherent connection to the site.[200]

In the vocabulary of Tropical Modernism, material comes through in the types of walls, roofs, floors, and other elements. When natural materials are left unfinished, unhewn, or untreated, it gives that connection to the site in a very perceivable way. However, as modernism is not just about reusing old methods of construction, it is also about using new methods or inventing and reinventing ways to build. These inventive solutions that make 'old' materials modern, create sophisticated designs that connect a design to both its site, and modernity.

Fig. 269. Vladimir Ossipoff, Pauling Residence. 1957, Round Top, Honolulu, Hawai'i.

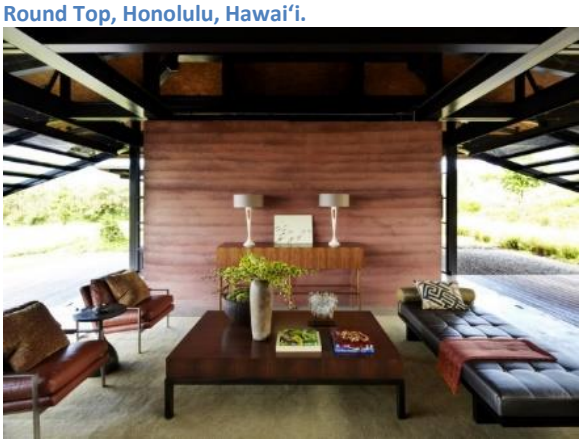


Fig. 270. Tom Kundig, *Slaughterhouse Beach House*. 2009, Maui, Hawai'i.

Two examples that come to mind of reinvention of 'old' ways into new modern ways are both from Hawai'i, but separate by about fifty years. Vladimir Ossipoff's Pauling Residence (Fig. 269) in Tantalus on the island of O'ahu was one of his early examples of large aggregate concrete walls. He later used this technique on churches and several other larger scaled buildings, but the way he did this here gave it a certain connection to the site and to Hawaiian architecture. Ossipoff's large aggregate concrete used local lava rock and stones found at the site in the concrete pours, and when the form work was pulled off, large faces of the stone where left unhidden by the concrete. This, paired with using it as a foundation platform for the Pauling house, gave it the resonance of lava rock platforms called *kahua*. Ossipoff wasn't seeking to make "Hawaiian" architecture, but this nod in material and form was enough to give the house a characteristic that matched the site. It was a modern reinterpretation of indigenous form and material use, and spoke to the history and the palate of the context. It was one way that he used material to explain context.

[200] See Appendix

The other example comes from Tom Kundig's Slaughterhouse Beach House on the island of Maui (Fig. 270). Several of the walls in his house are made from rammed earth. Rammed earth is an ancient building technique used by many indigenous peoples from around the world. Oddly enough, there wasn't a history of it in Hawai'i, mostly due to the volcanic rocky nature of the soil. So although Kundig is reprising an old building technique and reinterpreting it for a modern structure, this use isn't in reference to Hawaiian architecture like Ossipoff's was. However, because rammed earth walls literally use the earth and dirt from the site, it immediately takes on not only the pallet of the surroundings, but the feel and grittiness of the site. The way that the rammed earth walls are used in the design sentence as well is interesting. They are not structural walls, as the steel structure of the house is built up and around the walls, but they are left bare, exposed, and give an emphasis on the horizontality due to its striation. This ancient building system is rendered quite modern. It works as a thermal mass to keep the interior cool giving it both a functional and aesthetic reasoning.

Economic Conditions

Henry Seckel's comments on the economic conditions of Hawai'i and their effect on a regional architecture followed two points – the high cost of labor, and the high cost of land. Material is fairly inexpensive, or at least comparable to other areas of the United States, but labor costs are high for construction, and the initial cost of land leaves little budget left over for the architecture. Budget is an element that is often expressed in the final design outcome, and ingenious architects find a way to express it elegantly, inventively, and in a way that makes it seem entrepreneurial to use limited resources. Seckel's point was that due to the economic conditions in Hawai'i, houses tended to be small and poorly constructed – lacking of fine craftsmanship. However these constraints were occasionally overcome in Hawai'i, the Liljestrand Residence by Ossipoff for example has fine craftsmanship because they were able to save on material costs. The residence is made from inexpensive redwood, corrugated metal and the furniture was made from fallen trees.[201] The economic conditions of a project, site, and context however is a factor that is articulated in many projects outside of Hawai'i as well.

Fig. 271. Vo Trong Nghia, Low Cost House. 2012, Dongnai, Vietnam.

An example of the economic conditions being articulated in a design sentence could be Vo Trong Nghia's Low Cost House in Vietnam. Constructed with light weight steel frames that don't need the use of machines to be erected or assembled, along with wall panels of poly carbonate and bamboo, Nghia created a house that could be built for around 3,200 dollars. Given a small budget, Nghia created this model home as an example of using inexpensive, readily available materials, and minimal labor to create a house for low-income families.

The sentence structure that Nghia created in articulating the budget of the house, as well as the usefulness and sustainability aspect was through creating a very minimal sentence, of few words, that he capitalized on for their double meanings. For example, the envelope of the

[201] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff*

building is comprised of polycarbonate panels and bamboo set on the inside. The polycarbonate is easily accessible in Vietnam and readily available, making it an economic choice. Bamboo is also plentiful and cheap, but it is also fast growing, making it an eco-friendly material choice. The two together used in this way makes for a light diffusing wall system that blocks out the tropical sun, gives privacy to the interior, but also mitigates the need for artificial daylighting during daylight hours. The house is passively ventilated as well, as there is a gap between roof and ceiling where hot interior air can be evacuated and keep the interior cool. Many different, simple systems work together in this house, from start to finish, in keeping the costs down and reflecting the economic conditions of both user and context.

Climate

The climate in the tropics is rather mild and comfortable most days of the year. All that is really necessary is a roof to shield out the tropical sun and downpours, and to let the cool breezes cross ventilate underneath it. But there are more particulars than that due to each microclimate associated with each site. The syntax for climate articulation is one of the most sophisticated in its knowledge of the site and the interworking's of nature. There are many examples from many of the architects in Tropical Modernism for how they articulated the climate of their sites, some do it in a hidden gesture, and others do it overtly. Glenn Murcutt falls into the latter category.

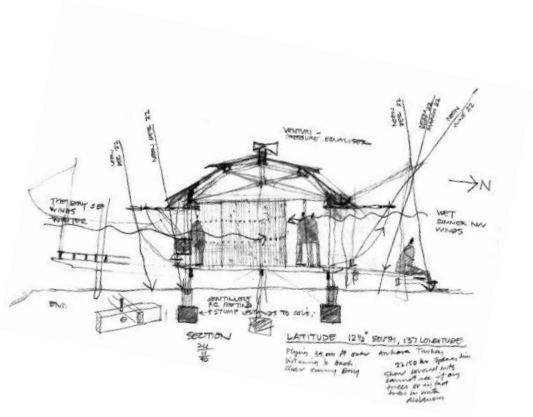


Fig. 272. Glenn Murcutt, *Marika-Alderton House, climate diagram*. 1994, Northern Territory, Australia.

Murcutt's whole thought process starts and ends with creating a house that is as adapted to its site as the trees around it. He starts with a comprehensive site analysis that determines wind directions during the different seasons, sun angles, and rain fall. As can be seen in his sketch for the Marika-Alderton House (Fig. 272), Murcutt then uses this information to inform the design of the house. Different design solutions are employed to let in breezes at different times of the year and to block the sun at other times of the year. The overall composition of the house might be fairly basic, but its order revolves around climate.

As diagramed out in the sketch, Murcutt notes that the dry winter winds come in from South-East and the wet summer winds come in from the North-West. Knowing this, Murcutt orientated his structure to have its long side perpendicular to this wind direction and short side parallel so that wind easily ventilates through the building. Pivoting walls that swing upward to create awnings are then used to not only secure the house when closed, but also shade the interior from the sun during different times of the year. Using words that have double uses, like the pivot wall that allows ventilation and shading, combined with others that deal with climate, Murcutt orders them in a way that is in direct response to the climate of the site. Understanding what is said in this design about passive climate strategies, is understanding not just the design, but the site itself. The house then is a tool to pass on this knowledge of the climate to its users, and can be seen as a tool for experiencing the climate, not just observing it.

Setting

Henry Seckel explained that the setting of a home in Hawai'i is most often than not on a sloping site. This can be said of most of the tropical regions, from Brazil, to California, to many other regions of the Pacific. Sites are usually along hillsides covered in vegetation but also offer spectacular views.

Fig. 273. Angelo Bucci, *House in Ubatuba*. 2005-09, Brazil.

One such example comes from Brazil in a house by SPBR (Fig. 273). Situated on a very steep slope, the house is entered from the upper most portion that connects the roof to a garage off of a mountain road. Then the house merely floats above the ground and among the trees on two large concrete columns from which the rest of the house cantilevers off of. The setting is quite spectacular, as it is steep and hard to build on, covered in a dense forest, but once you reach a certain height above the trees, offers a breath taking view of the ocean below.

The house could have been constructed into the sloping site, like many do on such sites, but instead they chose to communicate with the setting. It was a conversation in opportunities and constraints, as the site was hard to build on, the view was above the trees, and access to the site was from uphill, not down. So in observing the parameters of the site, they chose to elevate the structure from minimal connections to the ground, and let the floors split and grow as the elevation between the road and the ground increased. The floors gradually stepping down with the site increases living area, but also maintains the relationship of gliding above the forest floor, allowing nature to continue growing and the house serves as a vantage point in which to observe. In many ways the house is like a tree fort, built among the tree line and open to the elements, it is only the material selection and finish that separated this modern structure from the primitive tree hut.

Cultural Background

One of my favorite examples of the articulation of cultural background in a design comes again from Ossipoff in Hawai'i. Henry Seckel argued that there was too many different cultures in Hawai'i to create one type of regional architecture, but in a way, that has created a type – one that is multi-cultural.

Fig. 274. Vladimir Ossipoff, *Liljestrand Residence*. 1952, HI

Vladimir Ossipoff was born in Russia, raised in Japan until he was 16, and then immigrated to California where he attended UC Berkeley for architecture. He spoke Russian at home, Japanese on the streets and learned English at school. Ossipoff, himself was very multi-cultural and through his work can be seen this Japanese and Californian modern view on architecture. Howard Liljestrand, a client of Ossipoff's, was raised in Chengdu, Sichuan, China.

Howard and his wife, Betty, were planning on moving back to China where Howard's parents were, but settled in Hawai'i while there was too much political unrest in China at the time. Having always enjoyed staying in mountain cabins out of the hot city in his childhood in China, they decided to buy a plot of land along Tantalus Mountain, above Honolulu, rather than purchase beach property which was the norm at the time. When they contracted Ossipoff to design their residence (Fig. 274), they created together a beautiful, multi-cultural, Tropical Modern masterpiece. It is not one style – not a truly Japanese house, as inherited from Ossipoff's cultural background – not a Chinese styled home either, as inherited from Liljestrand's background – and not even a true example of California Modern. Instead, it has bits a pieces of all of these combined in a comprehendible and eloquent way. The elements used all have cultural references to the many different backgrounds represented in this project, but the syntax, or the order in which they were put together wasn't in any one culture, it was in a multi-lingual articulation that was able to combine them in a comprehendible way – like a pidgin design language. Using words, or elements, from Japan, China, California, and Hawai'i, the house speaks about its different backgrounds. What it says though is that in this house, these different worlds have found harmony. Articulating culture in design is more than just using words from different languages, it's also about ordering them in a way that it is comprehendible, and not gibberish.

Environmental Living

The one factor that Seckel says creates a regional architecture in Hawai'i is environmental living. It is the lifestyle of the people, not just their cultural backgrounds, but how they live, day to day. A lifestyle that is afforded by the wonderful weather, beautiful outdoors, sandy beaches and crystal waters. One that is exocentric, embraces the outdoors and celebrates the nature around them. Environmental living can be seen in the Hawaiian lanai, the wall-less rooms of Brazil, Australia, vegetated interiors of Vietnam, and view-orientated spaces of California. If a design language consist of vocabulary that help define space, environmental living is the factor in which those words are ordered to un-enclose space. Words like walls are left open or extended to create a space that either breaks to open up to the environment, or embrace the environment around them. The wall is just the word, but the length, size, and articulation are all controlled by the syntax of the design language.

Fig. 275. Marcio Kogan, *V4 House*. 2011, Brazil.

Fig. 276. Oscar Niemeyer, Cavanelas House. 1954, Brazil.

Two examples of environmental living from Brazil are from architects Marcio Kogan and Oscar Niemeyer. Both examples can be said to cater to the lifestyle of the users where interior space and exterior spaces are blurred, and are one and the same. But they accomplish this in different means. The meaning behind the design sentences that articulate environmental living are about being one with the surroundings, not just in an architectural way, but in a functional and experiential way. There are, of course, many ways of ordering a sentence to say this meaning, and many words to do so with. But in these two examples they say different things, while having the same meaning. In the example from Kogan (Fig. 275), the architecture is merely just a roof and a floor that define the living space. Sliding glass walls can be pushed away and there is a seamless connection between interior and exterior. Nature can literally walk straight in, uninterrupted.

This sentence is about breaking down the border between indoors and outdoors. It serves to just create an exterior space that is partially enclosed. Niemeyer's example (Fig. 276), however, says something different. Here the architecture is again a simple roof and floor, but the interior and exterior is split with a fixed glass wall. Though there are large doors that can be slid away, they don't completely hide like that in Kogan's house. But yet, the interior space seams larger. A long rock wall continues from the interior of the house far beyond the reach of the overhang of the roof, and the floor of the patio. The view outward is expansive, but this single wall starts to join the space into one large room. Yes there is interior and exterior, but through a simple gesture like the length of this wall, the space is one. Here the sentence is about embracing the outdoors, not simply breaking boundaries. The outside is part of the same space. These are just two ways to articulate environmental living, while using different syntax.

Language of Tropical Modernism

The language of Tropical Modernism is a combination of the intended meaning, the vocabulary, and the syntax discussed in the previous sections. In the end, it is the methodology that one should follow in creating a residence in the tropical region. This methodology is based around this idea of language as a way to portray that it is not just an aesthetic goal that one is trying to portray in their architecture, it is what that architecture communicates to people that view it. What is communicated are the regional factors of the tropics that create the various sentence structures. How it is manifested is through the combination and ordering of the various words of the design language. But what it says to its viewers is formed from the composition of all of these parts together. The ideal goal of the design language is to create poetry – an art form that communicates with mastery of a language, while leaving much unsaid and left for interpretation. A poem can convey many messages with few lines.

The methodology for design follows both the design language and the process laid out at the beginning of this paper.

Goals → Syntax → Context → Elements → Data → House

What is meant by this basic diagram is that one first starts with the desired end goals of the house. A study of both client and site will yield intentions for the design. From these intentions and goals, one applies this syntax. Meaning, one figures out what they want to say in this design language – climate, culture, setting, etc. Once there is an intended message for the design, this is then applied to the site and client. Meaning that if one wanted to communicate climate, they would need to understand how the climate of that site worked. With meaning and context combined, the sentence will start to take form. This is when the elements, or vocabulary are applied. Multiple meanings, applied with different aspects of the site and the client are brought together and instead of trying to say everything with many different words, there is an editing process that occurs. This process is less of a subtraction of words, though that is the goal, instead it is about using words that work for multiple meanings in the same sentence. For example if one were communicating climate they could wind up using words that also have cultural meaning to them, and if culture and climate work together, then one could use fewer words.

This process of study in the intention (goals), meaning behind the sentences (syntax), application to site and client (context), and manifestation through vocabulary (elements) will create the plans of the design (data).

The data are the drawings, plans, sections, etc., that make up the design of the house in planned form. When built, this creates the house. The intention however is that one doesn't just create a paragraph explaining site and client through the different factors and using the different words in the design language, but instead creates poetry that artfully paints an image of all these different factors.

This methodology mirrors the research undertaken in this project in reverse. In the research, we started with the built work (the house) of Tropical Modernists. These houses and projects were then analyzed and collected into data. Both data in terms of built form (the elements), but also data in terms of project framework (context). When this analysis of data, elements, and context

were completed, it yielded an understandable syntax for how they all went together. From the syntax, the intended goals of each project were understood.

That is the intention then for this next portion of the project. Now, we will use this methodology to create two different residential designs, in the hope of yielding different outcomes following the same process and language. The goal is to create poetry. Two different clients have been chosen, and those clients chose two sites of their own. Through discussions with the clients, and analysis of the sites, intended goals were created. These are goals like program, experiences, and feelings. From this I used the syntax of Tropical Modernism to start to form sentences that reflect these meanings. Different sentences were constructed that explain meanings like context, material, economy, climate, setting, cultural background, and environmental living – these are the regional factors for design. From the intended meaning and the syntax, I overlaid them with aspects of site and client. What is the context and climate of the site? What is the cultural background and lifestyle of the client? From this process, I then looked at how these meanings could be manifested and articulated in words, or elements. Following the meaning, order, and with use of the vocabulary, a design took form. This design was plans, or data, for which the house would be built from. The house won't actually take physical form, but through looking at the process that went into it, and the plans and data that come to represent it, we will see if indeed, poetry was created.

Poetry of Tropical Modernism

As stated previously, two projects have been chosen to represent the ideas put forth in this dissertation. Tropical Modern residential architecture pays special attention to conditions of site, client and culture, and it is this responsiveness and respect to these factors that makes this type of architecture suited to its place. Showing this responsive process in one example but wouldn't accurately portray its versatility. Examples of precedents have been represented in this paper, but in this section, examples of new work, executed by the author, will represent how with differences in site and client, two different projects can be attend while following the same process.

The process was to meet with two different clients, both of whom are not architects but have some involvement or interest in architecture. The clients chose their own empty lots in a neighborhood that they would like to live in. Then weekly, or every other week, meetings were held between clients individually and myself, to go over aspects of the design. These meetings started off with discussions about themselves, their culture, their lifestyle, and their past. These discussions then transferred over to topics about program and architecture. By the second meeting each client had chosen a site. Site analysis and research was done to not only understand aspects of climate, environment and setting, but also history and context. By the third meeting, an initial schematic design was presented. These three meetings were interspersed with meetings both with the Doctorate Committee and emails with clients. Feedback was received about initial schemes from both clients and committee, then the projects were reworked with new concerns and considerations. The final designs were presented to clients and committee and then the whole process was documented in the "language of Tropical Modernism" format.

The format is Goals (intentions of the project), Syntax/Context (following the factors for regional design), Vocabulary/Elements (following the order of vocabulary previously documented), Data (drawings and plans), then the House (represented here through renderings and 3D views).

The two projects, and their process, are presented as follows under the names Project A, and Project B. One is for a suburban single family house with an art studio, and the other is for a mid-density multi-family condominium complex for a community of users. The differences in their typologies was intended as to show that "residential" architecture applies to a larger area than just single family homes, but also applies to urban areas.

The "poetic" aspects of the design language are measured by the meanings portrayed when words are placed in certain orders. If words are brought together, and multiple meanings are accurately portrayed with minimal articulation, then the poetry is conveyed. Further explanation of this phenomena will be made later with the designs used as examples.

Project A: 2940 Woodlawn Drive

Goals

The intentions of the project are divided up into two factors or categories, the client's goals, and the goals of the site.

Client – Kamran Samimi

Kamran Samimi is a local sculptor and artist who wants a house and workshop space for himself and his work. A simple, in terms of program, one bedroom house that represents his lifestyle, but also his artwork, cultural background, and creative expressions. The goal of the client is a house that expresses his taste and occupation.

Site – Woodlawn Drive, Mānoa

Mānoa is a residential valley with ideal mauka views and a weather patterns of winds and rain. The project is limited in size and usage by the zoning, but also the character of the neighborhood. It is a quiet neighborhood with a range of structures that date back to Hawaiian pre-contact times, through colonial settlement, to mid-century bungalows and contemporary houses. The goal of the site is to fit into this character and natural valley.

Syntax/Context

The syntax and context work hand-in-hand where elements of the context – ordered in Seckel's factors for regional design – are understood through analysis creating the syntax, or order, for which the design should follow. The only additional factor to Seckel's list, is program, which is a starting factor for deciding the syntax and order.

Program

The spaces of the design are determined by client. They include the normal programmatic needs of a single family house – bedroom, living room, kitchen, dining space, carport, and bathrooms – but also spaces for his art – workshop, studio, and sculpture gardens. The client also wanted yard space to grow fruits and vegetables, a central courtyard, and a loft area for occasional guests and as a place of refuge.

The layout of the spaces are represented here (Fig. 277). They are first organized by which spaces needed to be next to other spaces. Then they were laid out by public to private, moving from the front of the lot to the rear. The workshop and studio spaces obviously were put adjacent to each other but the workshop also needed access to the carport. All of the living spaces were separated and connected by the central courtyard which acts as circulation and interior space. The bedroom and the loft access were at the rear of the property for greater privacy. Spaces were laid out with at least two side open so there was a better connection to the outdoor spaces.

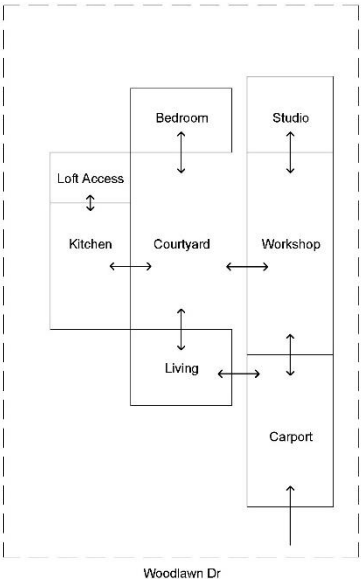


Fig. 277. Project A, *Program Diagram*

The spaces are organized into two different spatial parti. One follows an expanding pin-wheel idea which is orientated around a central courtyard (Fig. 278). The other parti divides the spaces into three bars, or groups, by their function with clear sightlines parting the bars (Fig. 279).

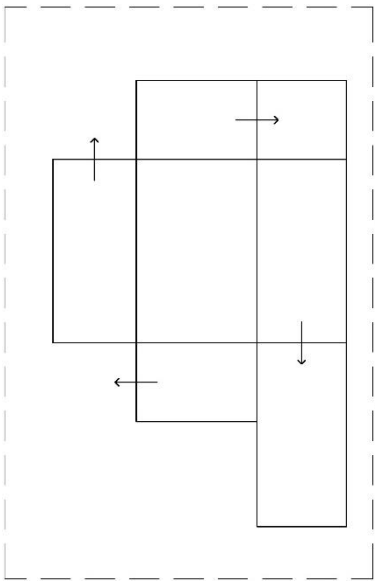


Fig. 278. Project A, *Parti Diagram, Pin Wheel*

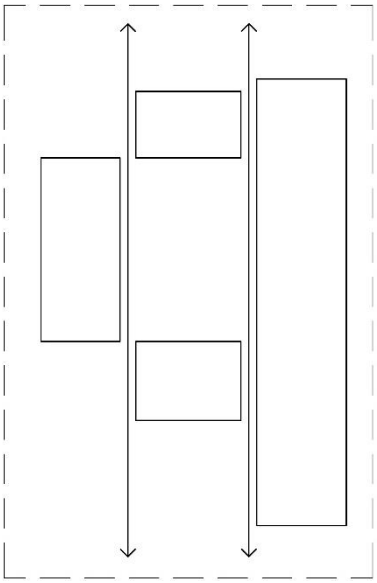


Fig. 279. Project A, *Parti Diagram, Bars*

Climate

The prevailing winds on the site run Mauka to Makai, coming from the NE direction. This is typical of Hawai'i's trade winds. Occasional Kona Wind days run opposite, where warm, humid air comes from the SW direction going up the valley. Due to the surrounding structures however, little wind flow is felt at grade on the site. The neighbor mauka is a two story house, while the neighbor makai is one story but with a steep pitched roof. Wind flows over the neighboring structures and doesn't reach the ground (Fig. 280).

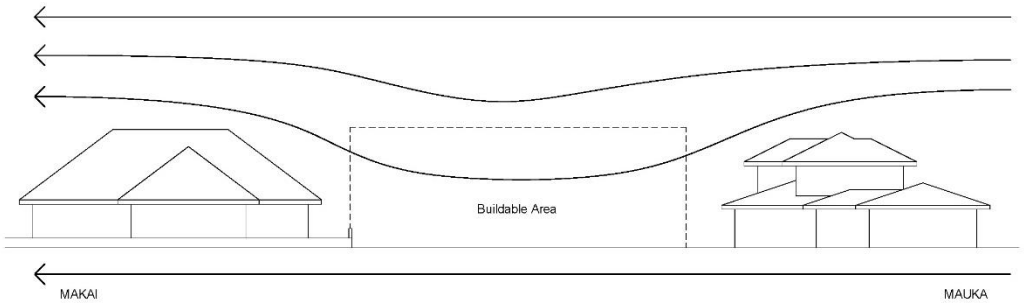


Fig. 280. Project A, *Wind Diagram, Existing Conditions*

In the photo (Fig. 281), you can see however, that the wind going mauka to makai is channeled through Woodlawn drive. The photo illustrates a tree on the street side of the property that is wind swept in that direction.

Fig. 281. Project A, *Photo of Site*

In the site plan below (Fig. 282), the orientation of the sun is mapped out. The bottom left side of the site is to the south, meaning that is the side with greatest sun exposure. Because of the latitude of Hawai'i, during the summer solstice, the sun rises and sets past the East-West axis. However, due to the topography of Mānoa valley, the sun is shaded during the first hours of the day, greater so in the winter months. The neighboring structures do little to shade the site.

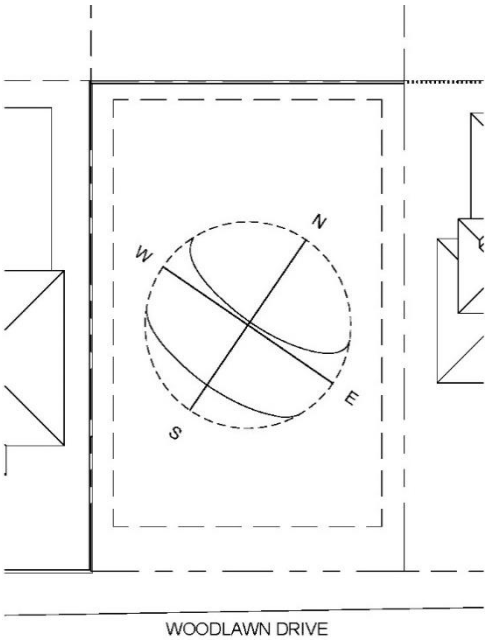


Fig. 282. Project A, *Site Plan - Sun Orientation*

The climate of Mānoa however is normally quite rainy. Due to the trade winds of Hawai'i blowing moisture laden air from the Pacific towards O'ahu, a unique microclimate is created on the leeward and windward sides of the island. The wind brings the clouds across the windward side up to the Ko'olau mountain range where the moisture is squeezed out of the air. This

creates a very rainy area windward of the ridge, at the ridge, and then the rain is finally finished just past the ridge on the leeward side. Mānoa is a valley situated just leeward of the Koʻolau's, on a nearly exact NE axis, aligned with the trade winds. Because of this typical weather cycle, Mānoa is frequented by rain showers and strong winds sweeping down the valley. This almost clockwork rainfall makes the valley lush and green with vegetation. It was once home to much wetland agriculture and has in it many springs. Mānoa stream also runs through the valley, fed by smaller streams that reach up into the mountain ranges. Because of this the ground in Mānoa is usually wet and there are different types of rains that the valley experiences.

Setting

The lot (Fig. 283), is 70' – 0" wide and 109' – 0" deep. Zoning dictates that there is a 5' – 0" setback on the back and side yards and a 10' setback on the front yard. The makai side of the property has a 4' tall CMU wall capped with a 2' wrought iron fence. On the Ewa side, or top side, of the lot, there is a 6' tall CMU wall. In between the project lot and the neighbor mauka, there is no fence or built wall. The site has rather flat topography with no significant grade change. There is currently no curb cut onto the property from the street.

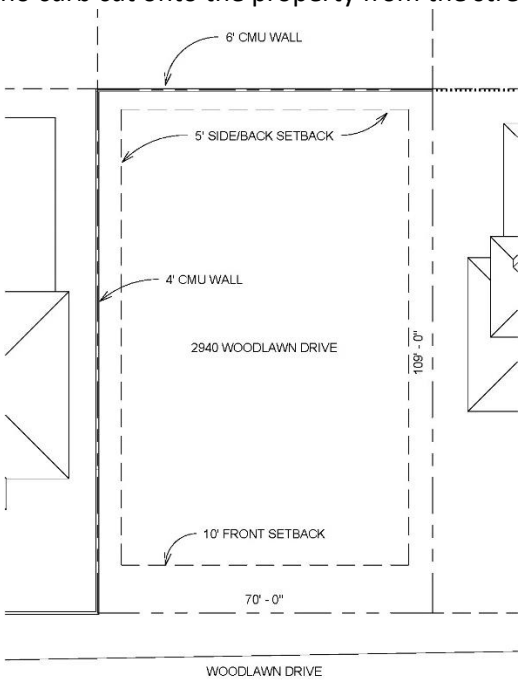


Fig. 283. Project A, *Site Plan - Existing Conditions*

A view further out of property shows the neighboring structures and lots (Fig. 284). The majority of the neighboring buildings were built in the mid-century era and are single story bungalows. This is true of the three lots to the rear of the property. However, the two houses mauka and makai of the property were built more recently. The house mauka was built as recently of 2008 and is a typical plantation inspired building of two floors. It lacks much character of the rest of the houses in the neighborhood built of wood and stone in a more bungalow style. The house makai of the property was also built within the past decade and is of a more Mission or Mediterranean style. Also rather out of place in the context. Its large clay tiled roof covers most of the property, and has a single story, flat roof extension to its rear. Because of the cost of land in Mānoa, often the land is worth more than the house built on it, so as people move in and redevelop, older houses are usually torn down for new buildings like these. To the records found

about this property however, no house has been built on this lot. This is also evident by the lack of a curb cut for a driveway.

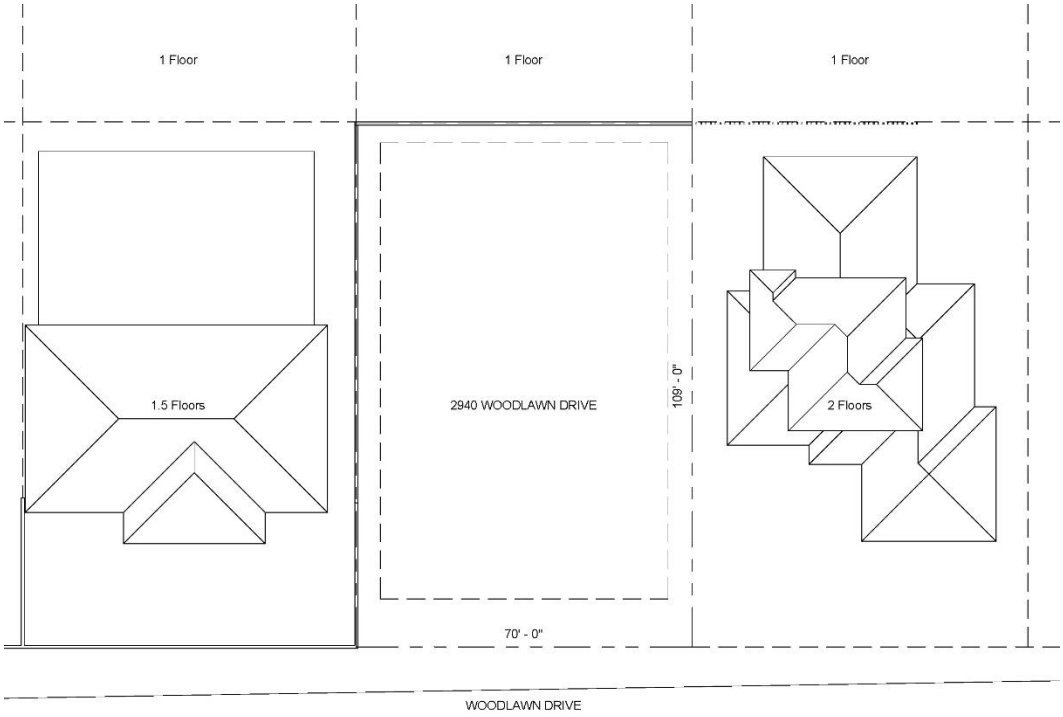


Fig. 284. Project A, *Block Plan*

Because of the spectacular topography of Mānoa valley, there are picturesque view channels of the mountains. The main views, however, are not NE towards Mauka, but rather in the direction of Diamond Head and Ewa of the property – to the front and rear.

Fig. 285. Project A, *View towards Tantalus Mountain*

To the rear of the property (Fig. 285), the ridge containing Tantalus and Round Top is framed. To the front of the property (Fig. 286), Wa‘ahila ridge is framed.

Fig. 286. Project A, *View towards Wa'ahila Ridge*

The view towards true mauka (Fig. 287), is blocked by the neighboring building from the first floor. However, from the rear of the site, and on a second floor or roof level, a view of Kōnāhuanui could be seen (Fig. 293). Kōnāhuanui is Mānoa valley’s highest peak. This is also the view from which the storms can be seen coming in and down the valley. There is little vegetation on the site currently except for a single tree at the street side of the property. The lot is currently covered in grass and it appears that it is mowed occasionally. However, the site probably could sustain much vegetation – with the consistent rain falls and southern exposure there could be a productive fruit and vegetable garden.

Fig. 287. Project A, *View Mauka*

Isolation

Mānoa valley is mauka of Waikiki and much of Honolulu. Mānoa, meaning vast, connects down to Mōʻiliʻili, Punahou, Makiki, Waikiki, and borders areas of downtown Honolulu and Kakaʻako. It also holds the University of Hawai'i Mānoa campus, Mid Pacific Institute, Punahou School, the University High School, as well as many other schools. All of these amenities make it an ideal place for people to live as it is close to much of the action of Honolulu, while still being a quiet residential neighborhood. However, because of the topography, there are few roads going in and out of Mānoa. For some that live in Mānoa and work in downtown Honolulu, it could take up to thirty minutes in the morning just to leave the valley due to the school traffic. Also due to the topography, there are many hills along these roads, making it harder to commute by bicycle. The hills, along with the rainfall, tend to mitigate the bike, moped and motorcycle commuters. Often, entering and leaving the valley can take a while during peak hours, and doing so is avoided if possible.

There is however the Mānoa marketplace just several blocks away along Woodlawn Drive, connecting the residential area with a grocery store, post office, banks, several coffee shops, and many eateries. It is centrally located within the valley, and within a short walk from the site.

Also, due to the client and the program, the intention is to have his art studio and workshop on property. He would then have less reasons to leave the valley at all. If this project were to be slated to be built soon, the location also would work well for him as he is currently a graduate student at the University of Hawai'i Mānoa Art Department – also just a short ways away. The few and only negatives about the isolation and vicinity of the site are dealt with in the programming and uses of the design.

Cultural Background

Client

Kamran Samimi grew up in Big Island, Hawai'i. He is an artist and sculpture whose work primarily speaks about the geography and geology of his childhood upbringing. Big Island is a newer island than O'ahu, geologically, meaning that it is rockier and is home to the tallest peaks of the islands and an active volcano. In his work are abstractions of the rocks, the mountains, and topography of this rocky island. Currently, there are two series of sculptures that he is working on. One is the cut stone series – with one set being named Suiseki (Fig. 288). Suiseki is the Japanese appreciation of small rocks as symbols and images of mountains. In this series, Kamran cuts the rocks into slices and splays them out. They are about the juxtaposition of clean lines and raw, natural stone. His other series, currently, is the diminishing sequence series. These are materialized in different ways, but primarily it consists of a series of suspended planes with an organically shaped cutout in the center that changes in size from large to small as it moves away from the viewer. The shapes Kamran cuts out are abstracted forms from geography. In this example (Fig. 289), Kamran abstracted the topography of Mauna Kea, the volcano on Big Island. From these we can see not only the attachment to place, that Kamran has with Big Island, but also the appreciation of the contrast between the clean, minimal plane, and the organic shapes of geology.

Fig. 288. Kamran Samimi, *Suiseki.* 2014.

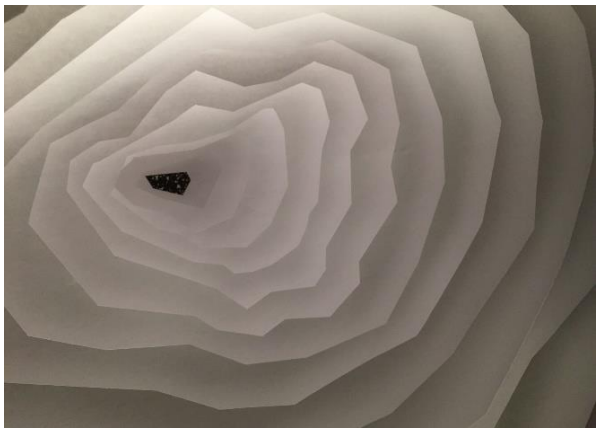


Fig. 289. Kamran Samimi, *Mauna Kea*. 2014.

From Kamran's work we can also see other aspects of his upbringing. One is appreciation of Japanese culture, as manifested in art and architecture. There are many examples of Japanese art and architecture throughout the islands, and the way he acknowledges this in his art is through Suiseki and his appreciation for the artist Isamu Noguchi. Noguchi was a sculptor for most of his life, but also made furniture for Herman Miller at one point and also later was trained as a landscape architect. Kamran's appreciation for his later sculptures can be seen in both artists work with natural stone.

Fig. 290. Vladimir Ossipoff, *Laupāhoehoe School*. 1952, image 2009, Laupāhoehoe, Hawai'i.

Fig. 291. Kamran Samimi, *Laupāhoehoe Point*. 2014.

As a child, Kamran also attended Laupāhoehoe School on the Big Island. Laupāhoehoe (Fig. 290) was designed by Hawai'i architect Vladimir Ossipoff, who was discussed in the precedent studies for his residential work on O'ahu. The building, like many of Ossipoff's designs, is well suited to its site both in terms of layout and material. The north east facing front opens up to let in the trade winds while shading the interior from the tropical sun. Ossipoff used a combination of wood structures with 'ōhia posts and board formed concrete with large aggregate stones coming through. This building has resonance with Kamran as it is not only a beautiful example of Tropical Modern architecture in Hawai'i, but also the material choices and attention to the site.

One piece of art of Kamran's that relates to his Laupāhoehoe home was his abstraction of the Laupāhoehoe Point (Fig. 291). Laupāhoehoe Point has a concrete break water of geometric shapes that Kamran abstracted out of cut lava stone.

Kamran is currently getting his Masters of Fine Arts at the University of Hawai'i Mānoa, where he previously got his Bachelors of Fine Arts. His ethnicity is half Persian and half Swedish/Norwegian. His Persian side, from which he bears his name, is from his father's side, a first generation immigrant from Iran. Kamran never learned Farsi, but some of the Persian culture was passed down to him from his father.

Site

Fig. 292. *Map of Mānoa Valley*

The culture of the site is rooted in Hawaiian history and storytelling circling around Mānoa valley. Several places of interest for Hawaiian cultural heritage are still in existence from pre-contact times (Fig. 292). At the current Mānoa Heritage Center, and former Cooke Estate in Mānoa, rests the Kūka'ō'ō Heiau. All that remains of it is the lava rock platform, but it was most

likely an agricultural heiau.[202] This heiau lies to the North West of the project site. A note of interest is that the heiau alignment is approximately along the same axis as the project site, facing mauka, makai, and Diamond Head, Ewa where mauka-makai is along a NE axis.

Another place of cultural interest is the Waʻahila Ridge, to the South East of the site. Waʻahila Ridge is one of the main view channels for the property, and it also has some importance to the Hawaiian stories about Mānoa Valley. Princess Kahalapuna, daughter of the wind and rain of Mānoa was married to Kauhi. Kauhi was an abusive husband and tried murdering Kahalapuna multiple times, but each time she was brought back to life by her ʻaumakua, or spirit animal. Her spirit animal was the white owl that lives in Mānoa. To punish Kauhi, the gods turned him into stone, as was common in Hawaiian stories. Kauhi became Waʻahila ridge, and it is said that the profile of a man lying on his back with head mauka and feet makai can be made out along the ridge. Today he is called Mānoa's sleeping giant. Opposite of Waʻahila ridge is the mountain side with Round Top and Tantalus. The base of this mountain ridge is called *Puʻu Pueo*. Puʻu means mound or hill, and pueo means owl. This area is named Owl Hill, after Kahalapuna's ʻaumakua.[203] Often in Hawaiian stories people were turned into stone, or pōhaku. Whether it was a single stone outcropping, or a whole mountain ridge, they were sometimes punished into being stone, or tried to live forever by being stone.[204]

The area around Pu'u Pueo is just above the Kūkaʻōʻō Heiau, and it is thought to be the sites of many other heiau as well. Some of the streets there are named after former heiau, like Puʻuhonua street. Other streets like Anuenue Street, was the former site of Kawapopo Heiau. Not too far from Kūkaʻōʻō Heiau is the Waiʻoli Tea Room, which lies on the site that was Kamehameha III's Mānoa Royal Retreat.[205]

In the North East, Mauka direction from the project site is Kōnāhuanui, Mānoa's highest peak and the highest peak of the Koʻolau range. This peak sits in the furthest back region of Mānoa, and though it can't be seen from ground level of the project site, from a second story level it should line up (Fig. 293). This axis is what the Kūkaʻōʻō Heiau is lined up with.

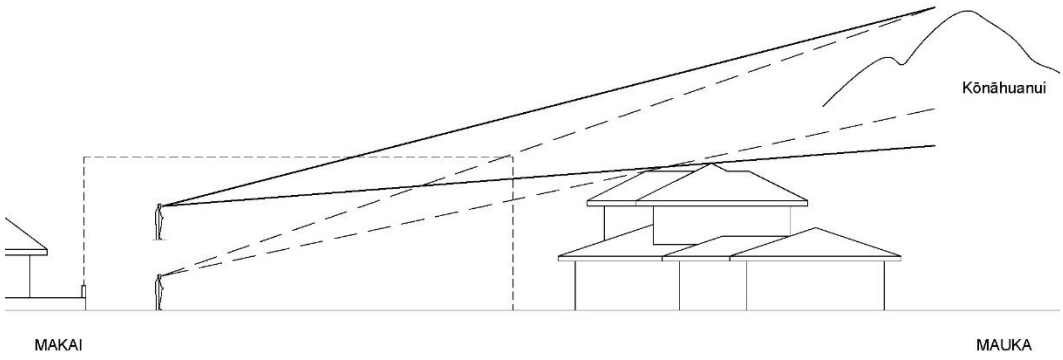


Fig. 293. Project A, *Diagram of View towards Kōnāhuanui*

[202] James, *Ancient Sites of O'ahu,* 33
[203] James, *Ancient Sites of O'ahu,* 33-35
[204] James, *Ancient Sites of O'ahu,* 10
[205] James, *Ancient Sites of O'ahu,* 33

The valley of Mānoa historically was filled with much agriculture. One good source for the history of an area in Hawai'i is to look to the street names for clues about what used to have been. Neighboring streets to Woodlawn Drive are streets like *Loʻi*, and *Kanu*. Loʻi is a wetland irrigated terrace for agriculture, particularly for taro. Kanu means to plant or to bury, like planting crops.[206] These indicators tell of a rich agriculture past to Mānoa perhaps something that this design can revive.

Materials

Stone

Many different indicators from the cultural background and context show that stone is a significant material for this design. Not only does Kamran use local stone in his artwork, but there are many other cultural resonances with both the place and the client. Kamran uses both raw and cut stone, in his work, saying that it serves as a connection between man and the cosmos. Humankind has worked for stone for millions of years as a building material. Kamran's work with stone connects him not only to those stone craftsman before him, but also to history of the planet.

But how stone was used in different vernacular architecture of the tropics is also a point of interest. In the tropical regions, most indigenous cultures built their early structures from wood as it allowed for better ventilation. But as it often rains in the tropics, it was important to keep these wood structures dry.

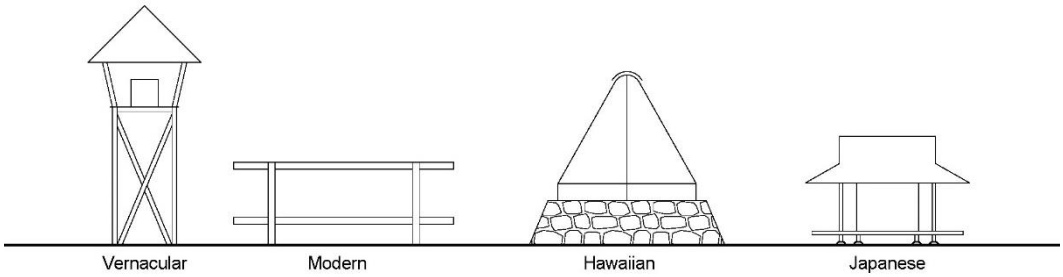


Fig. 294. ***Diagram of Tropical Elevated Building Typologies***

The typical vernacular method for keeping the occupants dry from the wet ground was to elevate the living space (Fig. 294), either on stilts or as a raised wood platform. This had security benefits as well. The Modern method is the elevated pavilion, floating above the ground plane. But the Hawaiian and Japanese builders had other methods that incorporated the use of stone.

In Hawaiian traditional architecture, the hale was built atop a dry masonry platform called a *Kahua*. The platform was expertly crafted so that as rain fell on the hale and platform it would seep between the cracks of the stones and not puddle up. This kept the hale interior floors dry and clean. It had the extra benefits of protecting from landslides and flash floods. The platform in Hawaiian architecture was also a way of spiritually elevating you closer to the gods. Heiau, Hawaiian temples, consisted primarily of just large stone platforms. Hawaiians also used stone masonry to create walls. These stone walls, or *papōhaku* (pa meaning wall, pōhaku meaning stone), were built either as defenses or to create fishponds. Some of these fishpond stone walls

[206] Pukui and Elbert, *Hawaiian Dictionary*

still exist today, as do the practices of pōhaku masonry. Stone was used in both platforms and walls for its water resistant capabilities, as well as its strong foundations.[207]

In Japanese traditional architecture, their expertly crafted wood buildings were built with elevated floors that separated the user from the ground. The wood posts and columns were planted atop large round stones and boulders – their ends crafted to each stone perfectly. These stones served as the foundations for the wood buildings. The stone elevated the wood high enough above the ground so that the posts would not get wet from ground water. Also, because Japan is frequented with earthquakes, the stone foundations allowed the ground and building to move separately in seismic conditions, mitigating damage. Of course this only worked with smaller buildings, but nonetheless, the ingenuity is incredible.[208]

Wood

Wood is another material choice that has resonance to the cultures and conditions of client and site. Much of the context buildings are stick-built single story bungalows. Hawai'i has a history of wood framed buildings, from Hawaiian traditional architecture to the architecture of Vladimir Ossipoff. The school that Kamran attended on Big Island, Laupāhoehoe, designed by Ossipoff, is known for its exposed wood rafters and 'ōhia wood posts.[209] Also the Japanese architectural heritage of both the area and of Kamran's past gives an affinity for articulated wood construction.

Corrugated Metal

Corrugated metal as a roofing material has a more experiential connotation than a cultural one. Though it makes for an economic building material, and like many areas of the tropics, it was used here in Hawai'i as well as a vernacular building material, it also has a special character that responds to the weather. It rains often in Mānoa, and the valley, as seen from below, is often shroud in a vail of clouds. The monochromatic nature of the corrugated metal responds well with the occasional grey skies that linger over the valley. But also, the sound that the rain makes on the metal roof gives a certain feeling to a home. It reminds the user that their house is a tool and vessel to experience nature with. Corrugated metal reminds them that it rains often in Mānoa.

Environmental Living

Lanai

The Hawaiian lanai started out as a building in itself. Now it is used in reference to any covered open space that is attached to the main house. Because of the climate of the site, all that is really needed is a roof overhead to block from the sun during hot days, and the rain during stormy days. The trade winds and cool breezes are often encouraged and needed. The whole house is open air with covered interior spaces to enjoy aspects of the surrounding nature and climate. There are some spaces that function more like a lanai in program, like the living space and dining space, while other spaces are open on one or two sides completely allowing both a physical and visual connection to the outdoors.

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[207] See Appendix

[208] Morse, *Japanese Homes and Their Surroundings,* 16

[209] Leineweber, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 58-61

Courtyard

The idea of the courtyard comes through from different origins for this design. Primarily, and initially, a central courtyard space was requested by the client to act as a sculpture garden. Secondly, it could be used as a place to enjoy vegetation and take a try at home agriculture, growing fruits and vegetables. Then it also became a space to enjoy a pond or a pool, some sort of water feature that could act as a visual interest for spaces of the house. Another benefit of the courtyard was its climatic responses. It helps to increase airflow through the house as well as let in natural daylight. But one of the major reasons for using the courtyard is that it changes the focus of the design. A courtyard house focuses a house inward, not outward. And in a tight residential neighborhood, a few feet off of a major road in the valley, privacy is a factor. By creating an interior yard, the focus is now up and through the courtyard opening over the house, sculpting the view rather than including the neighbor's houses.

Economic Conditions

Academic freedom was taken on different aspects concerning the economic feasibility of the project. The site alone costs around $800,000 and construction cost for a new house is not something that an art student can afford. That being said, precautions were taken to keep the budget at a reasonable level. Materials, program, and construction type kept it to a reasonable amount. Using materials like dimensional lumber, corrugated metal, and local stone keep building costs down. Also keeping the program rather small minimized the built square footage. The house is designed with no 'real' budget, but considerations were made and cost of the house is still a factor for design.

Vocabulary/Elements

The vocabulary, or elements, of the project come from the list presented earlier in this paper. With alternations do to configuration, and additions made, the following vocabulary are part of the Tropical Modern design language, but are all examples used on this design project only. They were chosen for their appropriateness and response to the various factors that made up the syntax and context description of this design.

Precedent Architects

Fig. 295. Vladimir Ossipoff, *Liljestrand Residence*. 1952, Honolulu, Hawai'i.

Fig. 296. Vladimir Ossipoff, *Laupāhoehoe School*. 1952, image 2009, Laupāhoehoe, Hawai'i.

In the designing of this house, and the choosing of elements and vocabulary to use for their appropriateness, several previously researched architects surfaced as having approached similar situations in similar ways. One was Hawai'i architect, Vladimir Ossipoff. He designed many houses with great appropriateness to Hawai'i, many which were discussed in this paper. But his

solutions and vocabulary that he used in conditions of climate, view channels, material, and construction suit well to this design in Mānoa. In specific, elements of the Liljestrand Residence, on Tantalus Mountain, North West of our site, has special consideration to view (Fig. 295). Ossipoff managed to hide and manipulate the view, framing it when it was just perfect. The Japanese influenced wood structure of the house, along with other material choices, make it fit in harmony with the surrounding vegetation. On another house, further up the mountain, the Pauling Residence also uses similar techniques, but also introduces a material change from other Ossipoff houses. At the Pauling House, Ossipoff raised the main floor to the second level, resting it atop a concrete platform. The platform, or foundation, uses large rock aggregate in its casting which leaves stones exposed from the grey surface. The overall shape of the platform, and this use of lava rock as aggregate give it the resonance of a Hawaiian stone platform, suiting well to the place. Ossipoff used a similar concrete technique on his school he designed on the Hamakua coast, Laupāhoehoe – the school that Kamran attended (Fig. 296). The school also is orientated to take in prevailing trade winds, opening up with glass faces to the north east and roof eaves that channel air in.

Fig. 297. Tom Kundig, *Slaughterhouse Beach House*. 2009, Maui, Hawai'i.

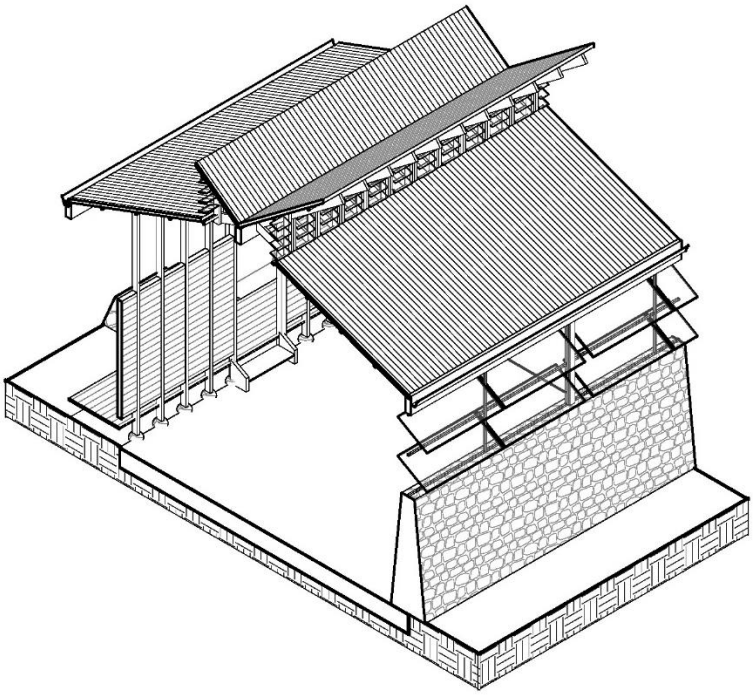
Fig. 298. Tom Kundig, Hawai'i Residence. Hawai'i.

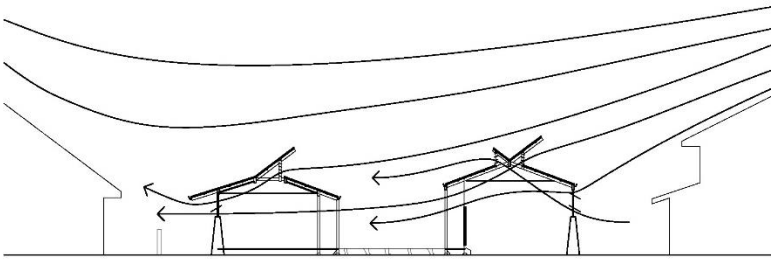
Another architect who used similar vocabulary to solve similar problems was Tom Kundig, and his two houses in Hawai'i. The Slaughterhouse Beach House on Maui, and the Hawai'i Residence on Big Island both have innovate reinterpretations of the vernacular roof styles. The Maui residence (Fig. 297) has a double pitched roof with an upturned corner, pointing towards the prevailing winds allowing wind to flow in. The Hawai'i residence (Fig. 298) has a gable roof that has two flaps on either side that can be actuated up and down, letting in more light and air when desired. Similar roof studies were used in this design. Also of note is their material choices as well. Both have corrugated metal roofs and light, tectonic frame work supporting them.

Roofs

Wind Scoop Gable

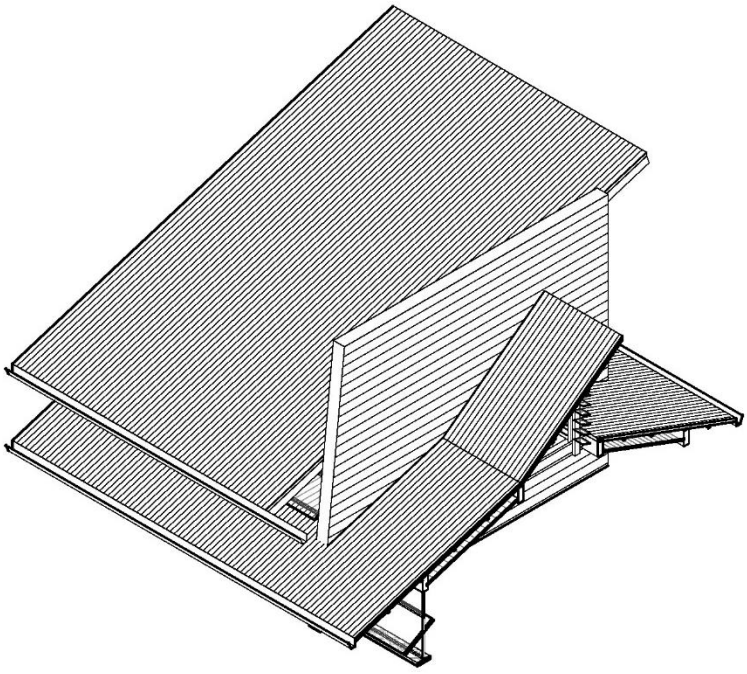
The idea behind this roof shape is to have a long section of the house run perpendicular to the wind, allowing air to flow through more easily. This, along with an upturned roof that extends past the ridge at a higher pitch, funnels air down into the space as it passes over neighboring buildings. The opening between the roofs is modulated with jalousies that can be closed in case of harsh Mānoa storms. A smaller section is also turned up in the opposite direction to help evacuate hot air with the prevailing winds, or bring in breezes during Kona wind days. The roof is also pitched to allow water runoff during rain storms.





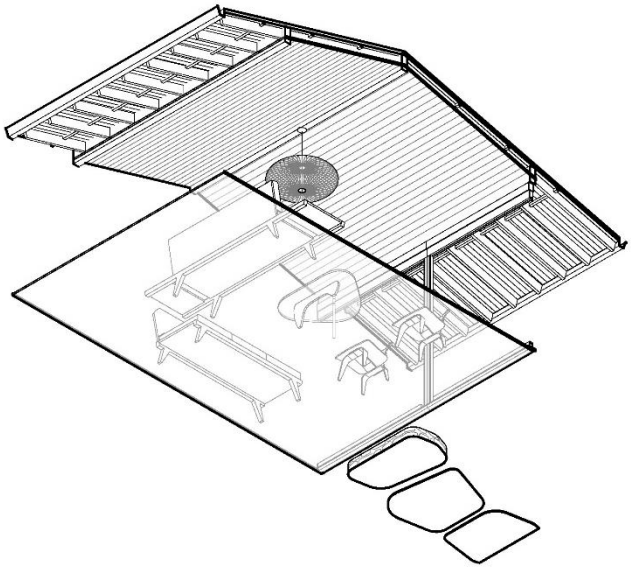
Corrugated Metal

Corrugated metal was chosen as the roofing material for several reasons. Secondarily is the economics, but primarily is its resonance with the Hawai'i regional architecture and the weather of Mānoa. It was a common roofing material in Hawai'i, Ossipoff used it at the Liljestrand House, but it also celebrates the rain. Through its acoustics when rain falls on it, and its monochromatic pallet that resonates with grey skies, the corrugated metal roof communicates the site and weather.



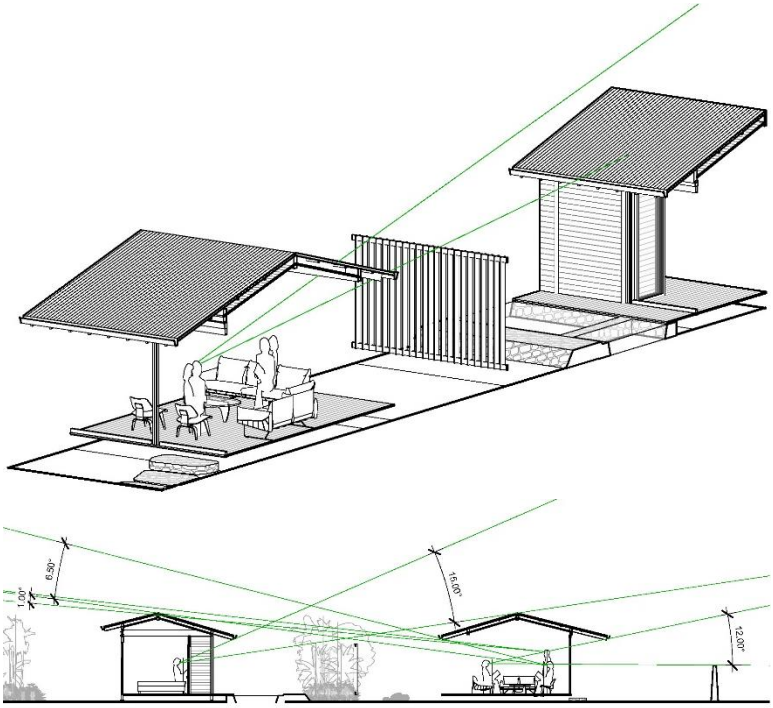
Wood Ceiling Exposed Rafter Overhang

Another technique taken from Ossipoff residences, the interior space has a ceiling clad in wood paneling, while the exterior overhang is left exposed from below. This extra paneling on the interior also allows for an insulation gap between metal roof and interior space. The exposed rafters and corrugated metal underside also help make the profile of the roof thinner at its edges, making the structure seem lighter.



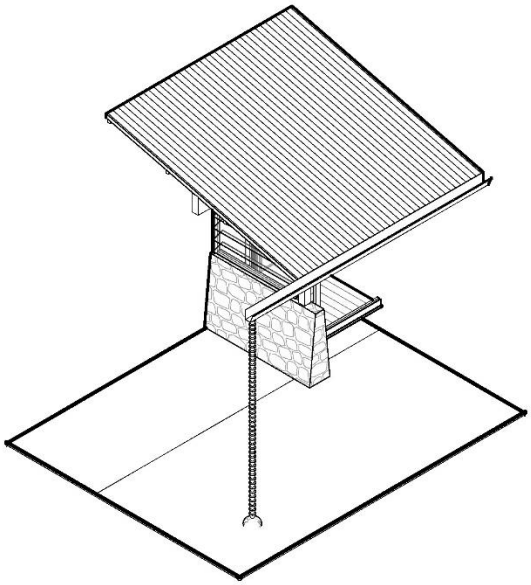
View Framing Overhang

Ossipoff used a similar technique at the Liljestrand house, where the overhang sits low enough above the ground that it blocks some of the view while standing. When sitting, the view is framed. Here, because of the central courtyard, views of the surrounding valley are framed in the courtyard opening and neighboring houses are blocked. Even though this is in a tight residential neighborhood, from within the house one doesn't see neighboring houses in captured views.



Rain Chain and Extended Gutter

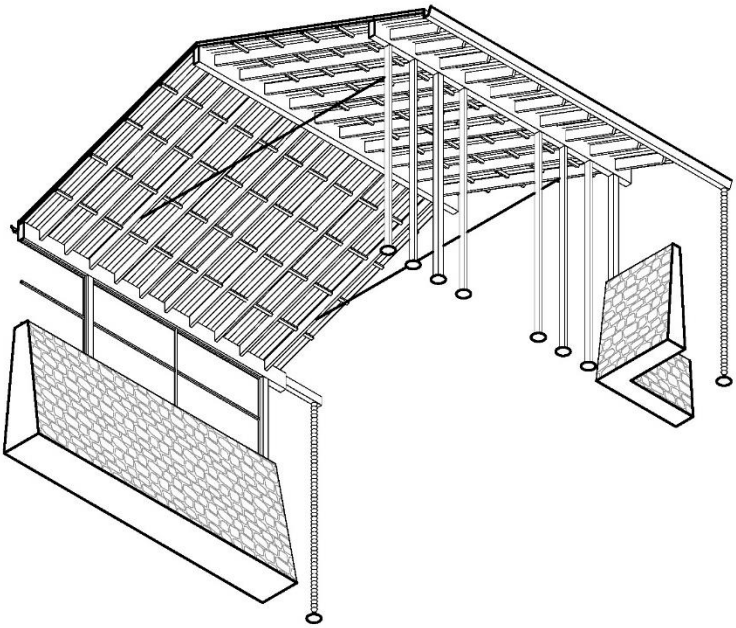
The rain chain is taken from Japanese architecture where instead of a downspout, the rain pours down an iron chain onto a rock basin. Here the gutters are also extended 2'–6" beyond the roof edge both to extend the visual line of the roof, but also to bring the pouring rain water away from splashing on the building.



Structure

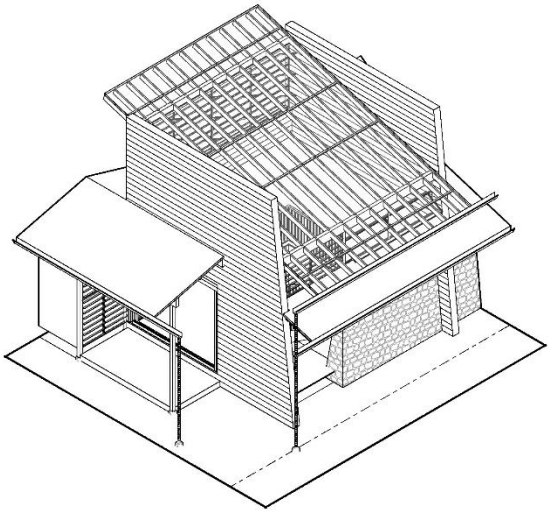
Wood Structure with Tension Cables

This structural system was used in areas with wide spans and tall ceilings were necessary – like the workshop and studio. The idea is to keep the wood framework as light as possible and take out some of the tension load with metal cables strung between rafters. The cables have a turn buckle in the middle, and help express the tectonic layered nature of the building.



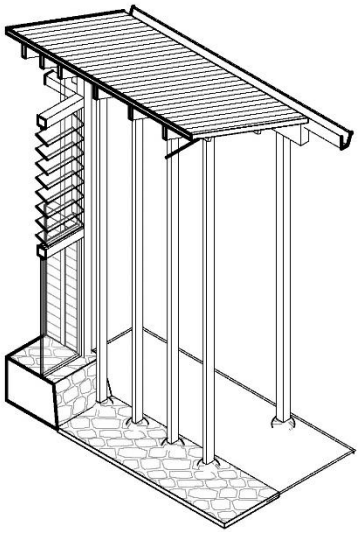
Cast-in-Place Concrete

Two large cast-in-place concrete walls hold up the second floor loft and roof. The rest of the structure of the house is lightweight and thin, here, the mass of the concrete juxtaposes that language. The two walls are held apart by a concrete beam towards the open side of the roof.



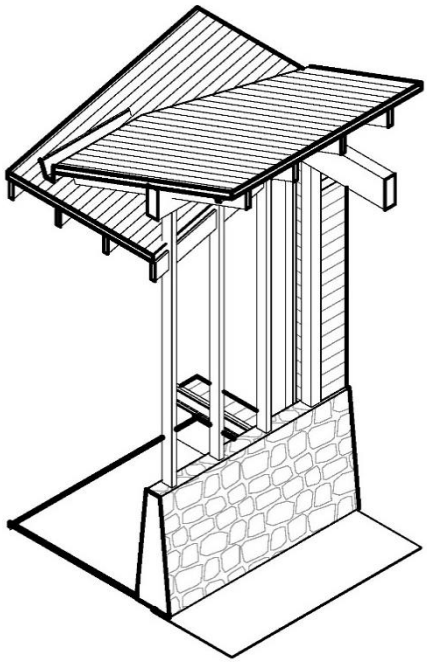
Wood Posts to Stone Foundations

This technique is taken from traditional Japanese architecture where the wood post, or column, comes down and meets the ground with a round boulder. The stone keeps the end of the column dry from sitting in the mud or dirt, preserving it longer from rot. This use of stones as a structure is celebrated through repetition.



Wood Posts to Stone Walls

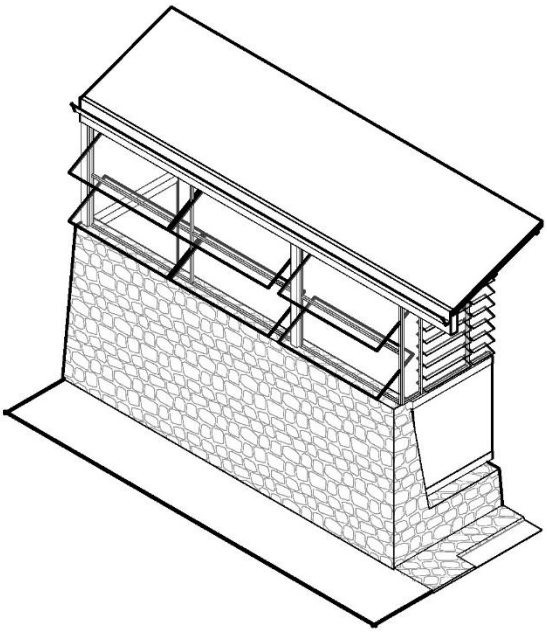
Like the posts to individual stone foundations, here the posts come down to a stone wall. The stone wall acts as a more stable foundation but also makes use of local building techniques and relates more to the Hawaiian cultural tones than the strictly Japanese ones, as the other meeting of stone and wood.



Walls

Papōhaku

In many sites in Hawai'i, lava rock masonry walls are used to relate back to the indigenous architecture. These rock walls relate back to not only the heiau in Mānoa, but also many of the other houses. As Kamran feels that his work with stone relates him back to the stone workers of history, this stone wall does the same. Stacked so it is wider at the base than at its top, it tappers up and adds another gesture to the composition of the house.



Large Aggregate Board Formed Concrete

This is a technique taken from Vladimir Ossipoff where large stones were place into the concrete pour with the end result being the stones poking through the face. This example is from the Laupāhoehoe school.

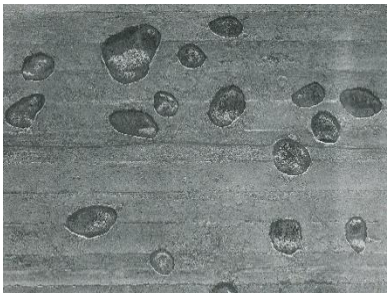
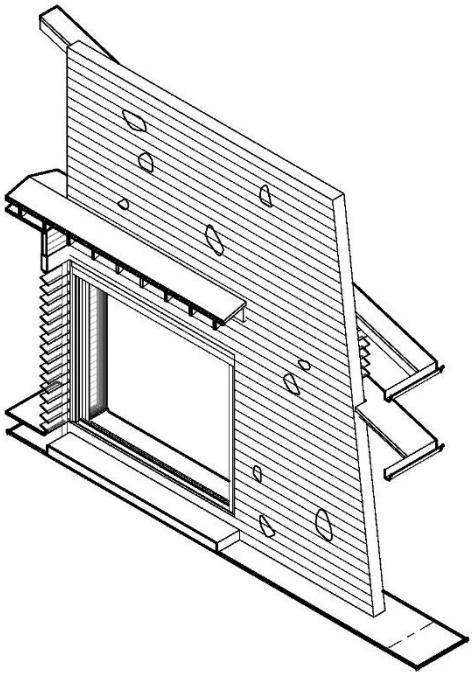
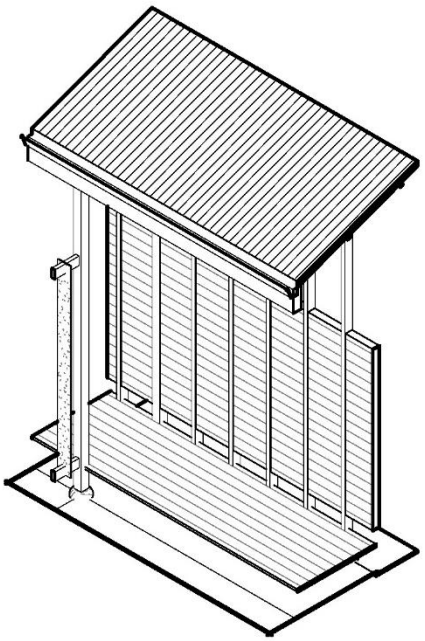


Fig. 299. Vladimir Ossipoff, *Laupāhoehoe School, wall detail*. 1952, Laupāhoehoe, Hawai'i.



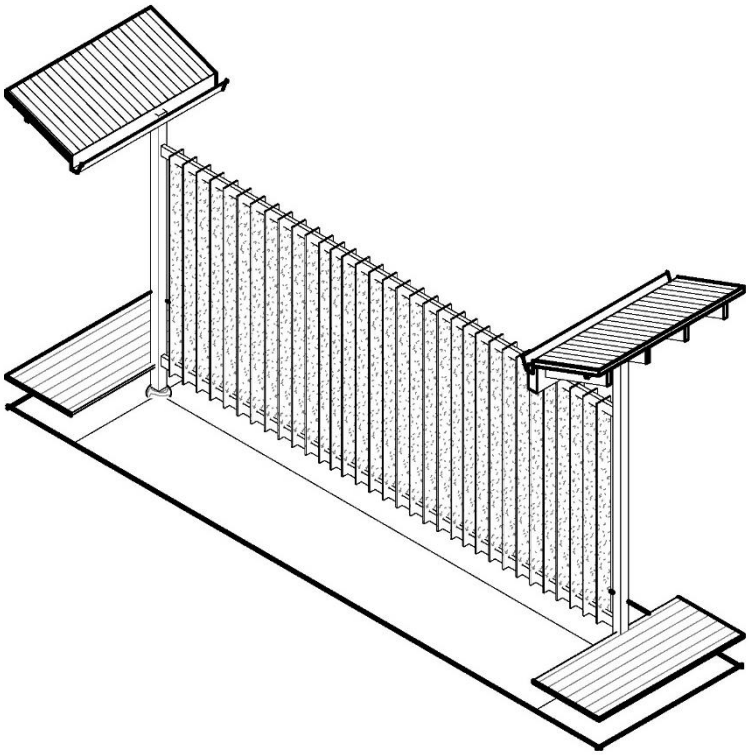
Wood Paneling

The wood paneling here is set between the wall posts, creating a thin wall but also creating a warm back drop for the house. Rather than having plaster or gypsum walls that are painted, the stained wood boards give a more natural, raw character to the interior of the house. The wood paneling resonates with the Liljestrand House by Ossipoff, and other architecture of Hawai'i and Japan. The wood panels are of a different tone and grain than the posts, giving a little more contrast to the surface.



Stone Vertical Fin Wall

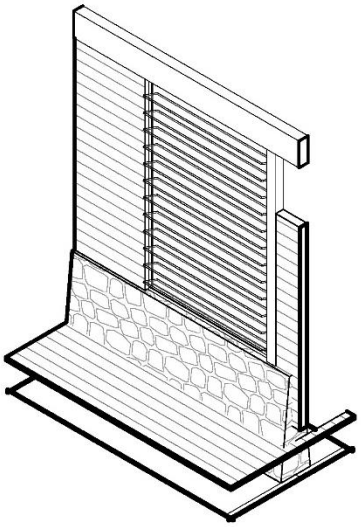
This partition wall cuts through the middle of the courtyard, dividing it into two main sections. One side is a rock sculpture garden, while the other is a vegetated garden. The partition wall floats above the ground suspended by posts on either side. The vertical fins are made from cut lava rock tiles – "*puka* rock" tile. The stone has holes and gaps in it where light and air can come through. What this wall does is act as a visual barrier between the two spaces and serves as a backdrop to the sculpture garden. It visually obstructs but still allows ventilation.



Windows

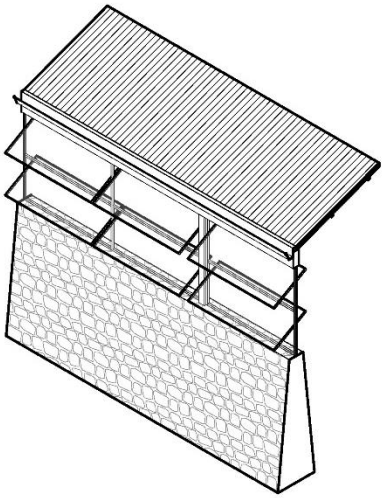
Glass Jalousies

Glass louvers or jalousies are a common element of Hawai'i regional architecture. They allow ample air flow when opened, but can be closed in case of storms and high winds. In this design they are used in most areas where fixed windows would be to increase air movement, but also allow modularity of the wind speeds.



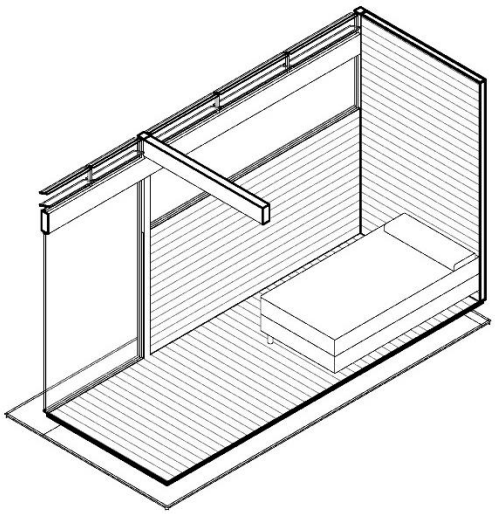
Pivot Windows

Working like larger glass jalousies, these pivot windows are framed to allow larger panes of glass. They swing outward so that rain doesn't come in through the opening, but while maintaining air flow and daylighting. Here they are stacked in two rows, other places they are a single row, or a whole wall face.



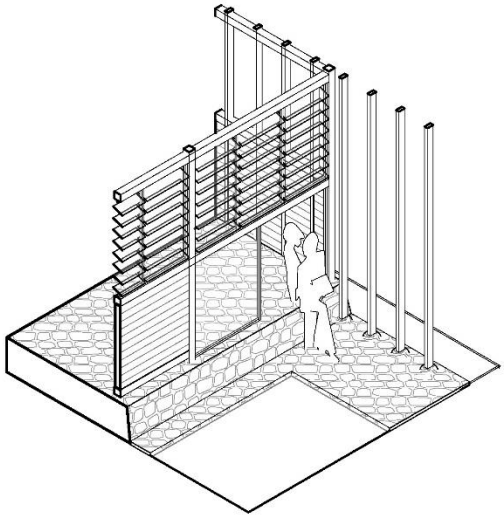
Picture Windows

Picture windows in this design are simple fixed windows. They are shaped to frame views of the outdoors unobstructed by frames or mullions. To maintain airflow, a small row of glass jalousies sit between the picture window head, and the underside of the roof. The window in this image frames a view of the mountain ridge beyond.



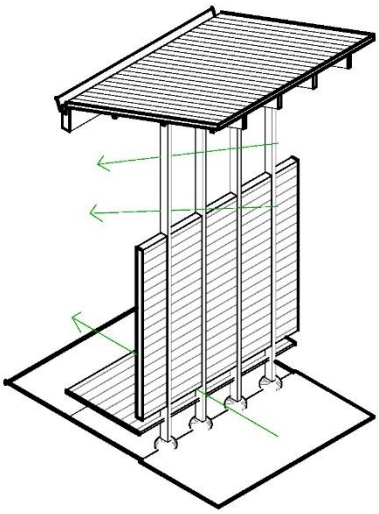
Japanese Sliding Window

This set of windows sits level with the interior floor, a distance of 18” above grade. The window works like the entrance to a Japanese tea house, where one must duck and crawl through to enter. Instead, here the window acts as a portal, and a place to sit and rest, looking out over the pond and garden off of the studio space.



Sill and Head Vents

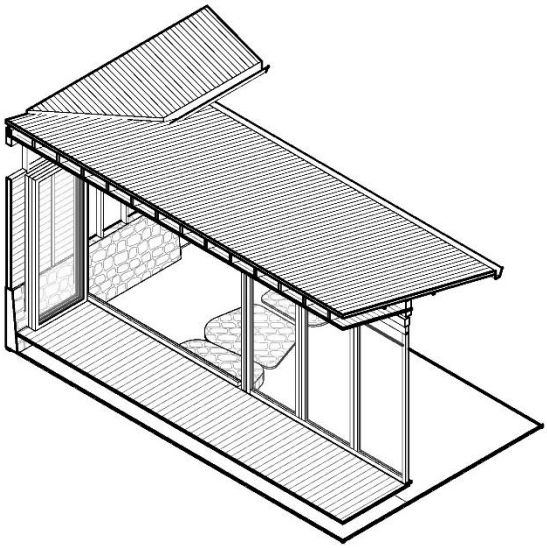
Along the walls that run perpendicular to the wind flow, gaps are left between wall and floor, and wall and ceiling. This insures that air still flows through the spaces, but the wall still provides a visual barrier.



Doors

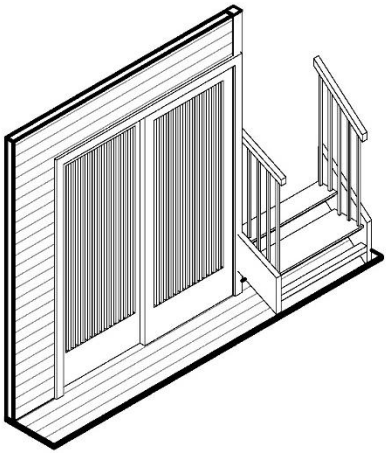
Folding Glass Doors

These large glass doors can open up an entire wall to the outdoors and be folded away to the side in a space that is just as wide as one panel. Here, one wall is comprised of folding glass doors. One set of three is open, folded to the side, and the other set is closed, making a weatherproof glass wall. They maintain the visual connection to the outdoors even when closed.



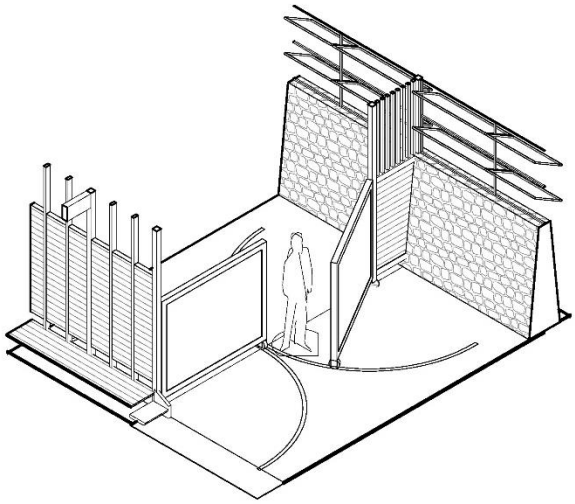
Sliding Mashrabiyas

These sliding doors are like others in tropical architecture, except instead of being like shoji having panels of paper, there is instead a lattice work of wood members. This frame work detail has resonance with Arabian Mashrabiyas, giving reference to Kamran's Middle Eastern heritage.



Industrial Swinging Doors

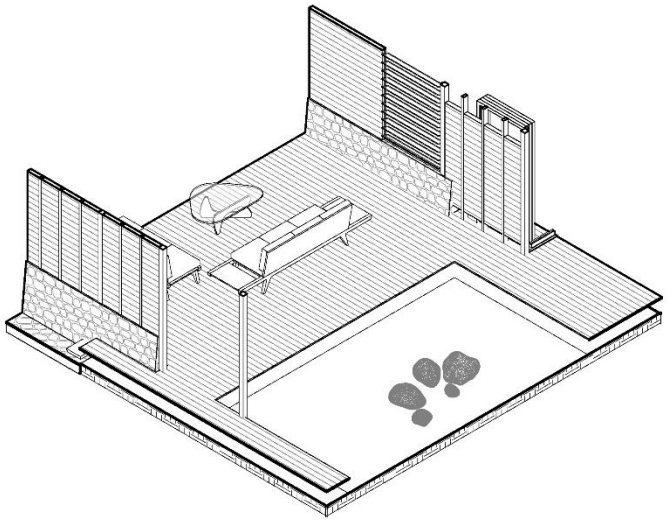
This wall that divides the carport from the workshop can be swung open to allow transport of heavy sculptures in and out of the space. The large doors are framed in timber and roll across the concrete slab on steel wheels on a steel track, cast into the slab. They also can be locked to secure the workshop from the carport and opened when needed.



Floors

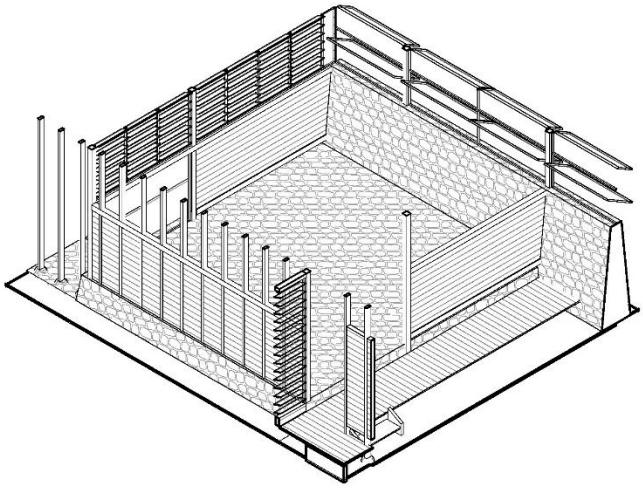
Elevated Wood Floor

With the understanding that it rains often in Mānoa, and therefore the ground is usually damp, the idea is to articulate this aspect of the environment by elevating the main floor of the house a foot above grade. This creates a separation from the interior and exterior spaces where in most places there isn't a wall to do so.



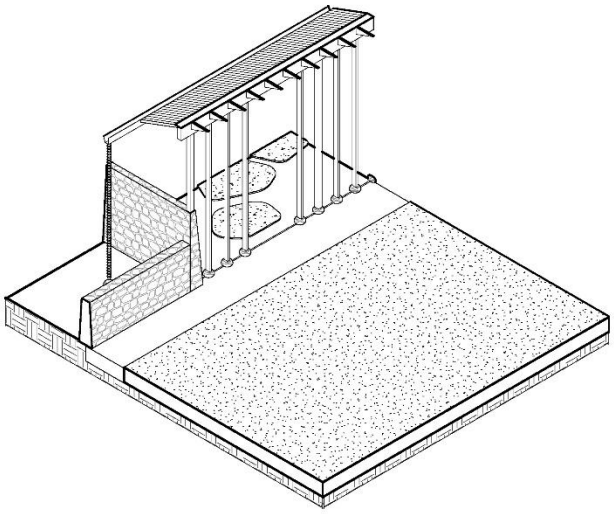
Stone Platform

In Hawaiian traditional architecture, the hale was built atop a stone platform of dry masonry. Here, the same idea is created for the studio space, elevating it above the other first floor spaces, but still providing a strong ground plane to work on. Its rock surface is left bare and smoother rocks are chosen for the top.



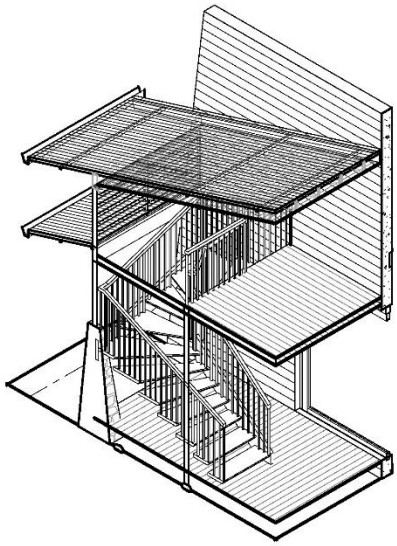
At Grade Concrete Slab

The floor of the workshop and the carport is a simple cast-in-place concrete slab on grade. It was chosen to do this so that not only is there a smoother transition from street to carport for the house, but also to provide a stable ground plane for working on large heavy stone sculptures. They can be carted from one space to the other.



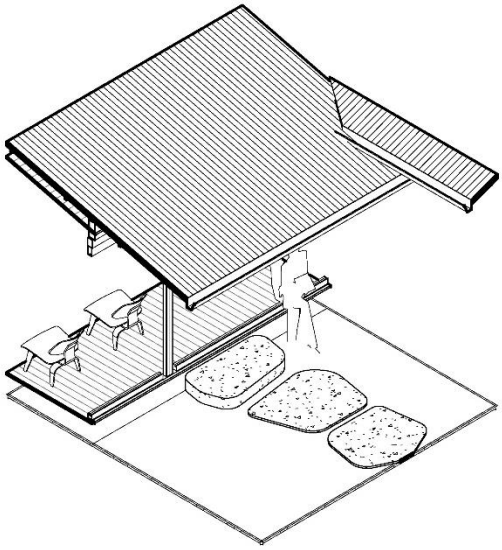
Stairs to Loft

The stairway up to the loft is tucked behind a concrete wall and under a low roof. The stairs are made from wood and are crafted to wind their way up to the loft level. The backside is open to the outdoors and the stairs give access to a row of jalousie windows that rest between two overhangs. The stairway is tight, but is meant to be a private space hidden in the rear of the house.



Stone Step

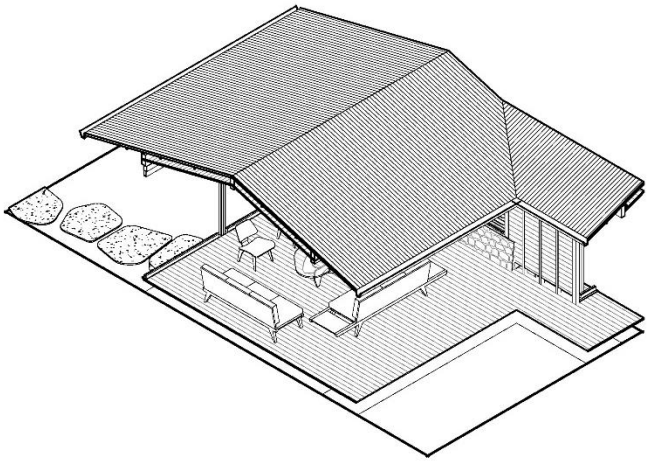
This Japanese tradition is to have a large, irregular shaped stone with a flat top used as the step between the ground and the floor of the house. The separation of floor and ground is used to sit on as one puts on or takes off their shoes before entering. Typically, one leaves their shoes on or by this step. The stone step then leads to a pathway through the garden to the driveway.



Outdoor Rooms

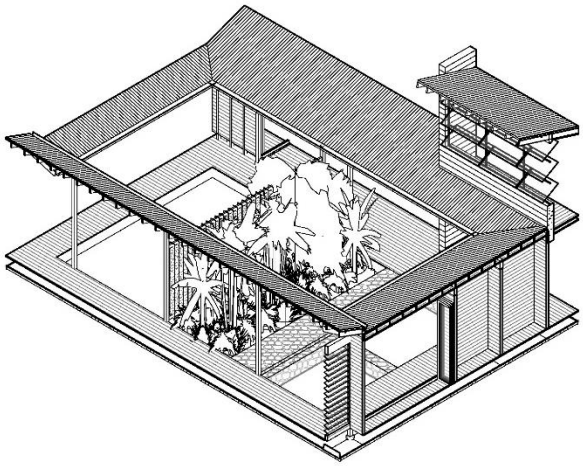
Lanai

Most of the rooms in this house function as a lanai, where at least one of the faces is completely open to the elements. The living room programmatically acts more like a lanai because it is a space for lounging and enjoying views. Two parallel sides are open to both allow ventilation, and un-obstruct view channels.



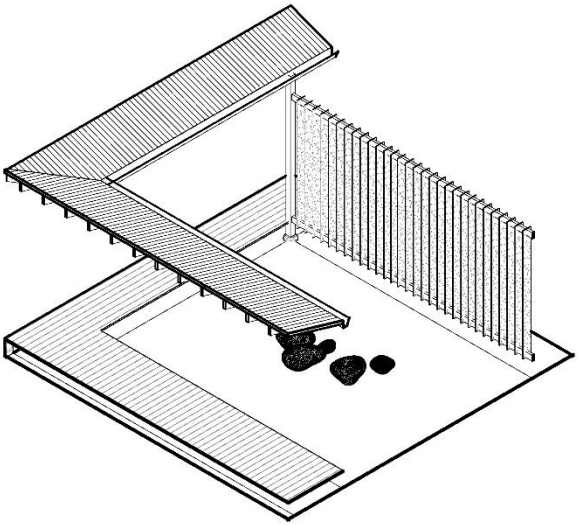
Courtyard

The central courtyard connects every room of the house. The main circulation is around the courtyard part from a stone bridge that splits through the middle. The courtyard has a sculpture garden, vegetated garden, and water features. It is the focal point and organizing element of the design.



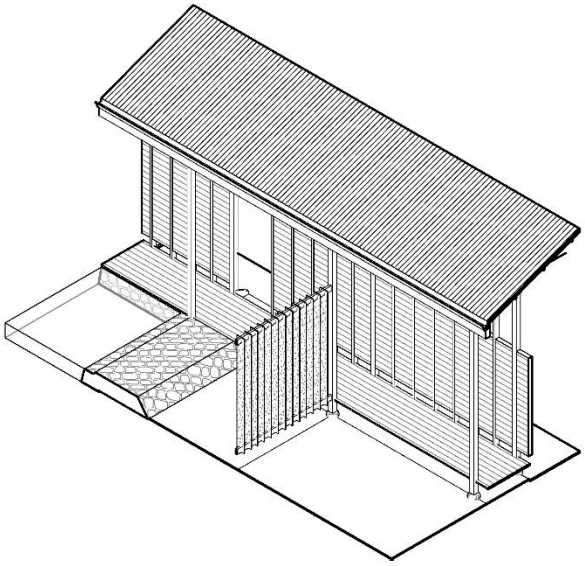
Sculpture Garden

There are several sculpture gardens in the design to showcase the client's artwork. The main one, in the courtyard, faces the front of the house and is one of the first things one sees upon entering. It is styled off of a Japanese rock garden with gravel ground cover and no vegetation. It is also backed by a feature wall of stone fins.



Engawa

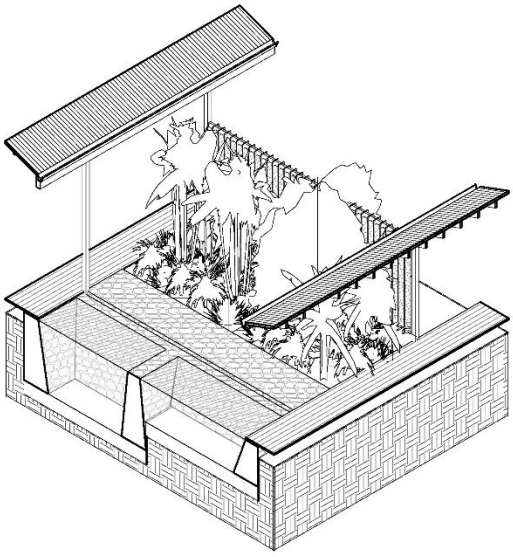
The circulation around the courtyard is protected by the roof's overhang. The space that is created between roof and floor, interior rooms and exterior courtyard is a rendition of the Japanese engawa. Many of the elements of this engawa are typical of Japanese architecture, but differences in size and other details make it a modern interpretation rather than reproduction.



Nature

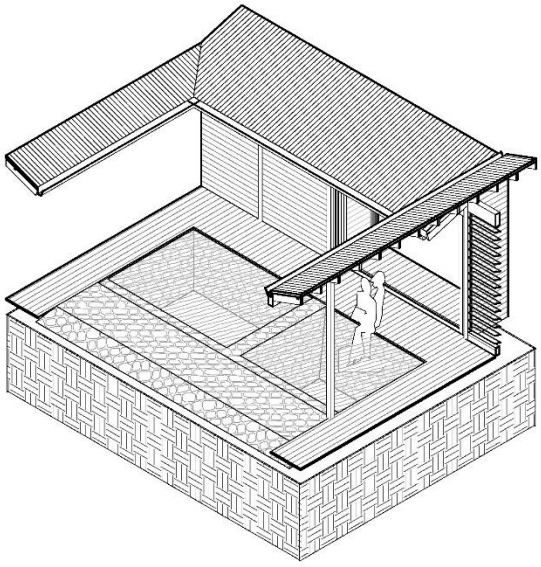
Fruit and Vegetable Garden

This garden is within the central courtyard and contains fruit baring trees like banana and orange trees. There is also room to grow other fruits and vegetables. This space is connected right off of the kitchen, and serviced by a stone bridge for easier access. This densely vegetated pocket in the courtyard helps to create a more private area of the house by the bedroom.



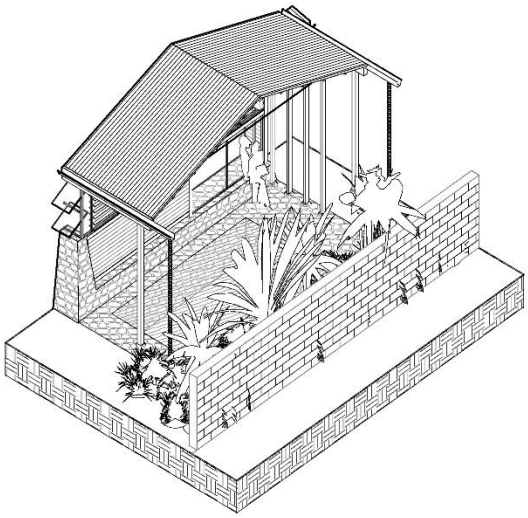
Pond and Hot Tub

This water feature is in the main courtyard space and is in between the bedroom and the garden. One side is a pond for fish and growing water plants. The other side is a heated soaking tub with water jets. The two pits are built up with lava rock in the same manner as the stone bridge that separates it from the garden. These ponds respond to the loʻi patches once found in Mānoa.



Pond

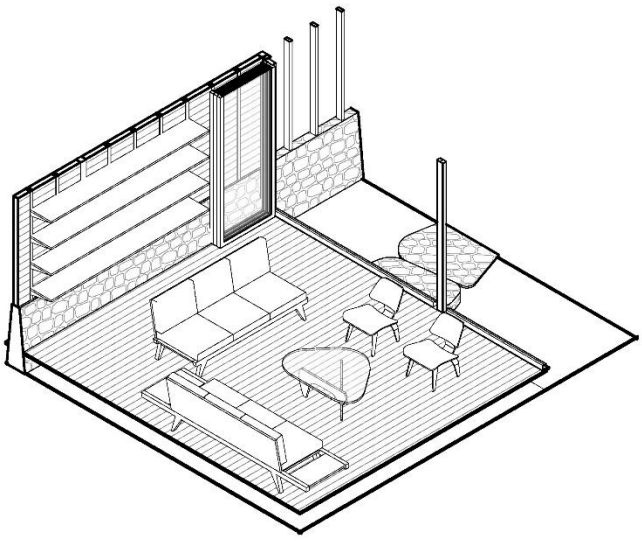
This pond is just outside the studio space and is connected to the backyard. It serves as a refuge place to look out on the nature in the water and beyond to the tropical garden. It is also lined in lava rock that connects it up to the studio platform and rock walls. The pond is accessed through the studio through a low sliding window.



Furniture

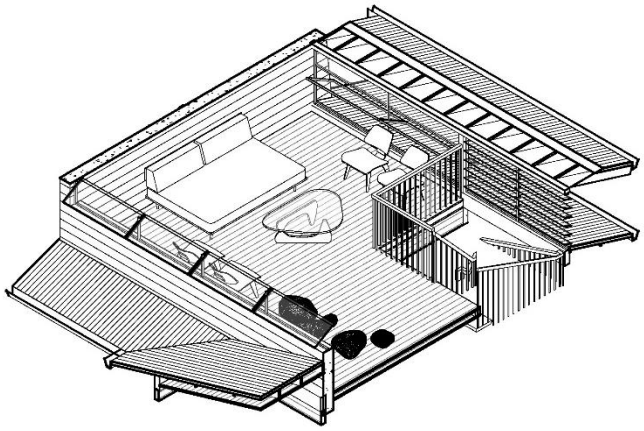
Midcentury Designer

The client's current source for artistic inspiration is from sculptor, Isamu Noguchi. Noguchi designed this table for Herman Miller and it has been synonymous with midcentury design ever since. The two Eames plywood chairs complement the character of the table as well as pairing with two other midcentury modern sofas.



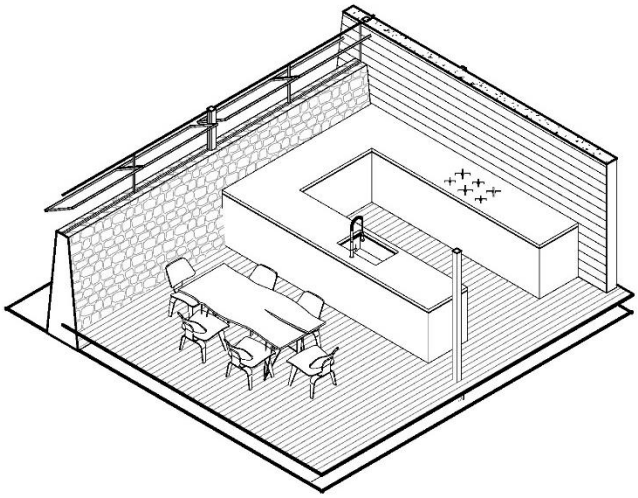
Pune‘e

This pune‘e is located up in the loft area of the house. This space is meant for refuge and also to act as a second bedroom on occasion. The pune‘e helps cater this comfortable space and double functions as a guest bed when needed. The space has other furniture and artwork of the client.



Kitchen and Dining

A live-edge wood dining table expresses the raw nature of the wood of the house. The table is paired with Eames dining chairs. The kitchen is minimal with concrete countertops and wood cabinets that match the wood paneling of the rest of the house. The lack of overhead cabinets declutters the kitchen.



Data

The goals put forth by the site and client were then communicated through ordering sentences translating these goals. The sentence order was based on factors for regional design – like climate, material, culture, and environmental living. Words were then put into these sentences to give them visual communications. These words were different types of roofs, walls, and spaces that when put together told the story of different aspects of the site or the client. The previous section was the list of the various different words used in this design. Individually they come together to make up the language of the house. The design of the house in its totality is the data, or the final written sentence. Here it is documented in typical architectural plans, elevations and sections. Following this depiction of the data of the house is the section on the final house itself, as seen through renderings and visualizations.

Floor Plans

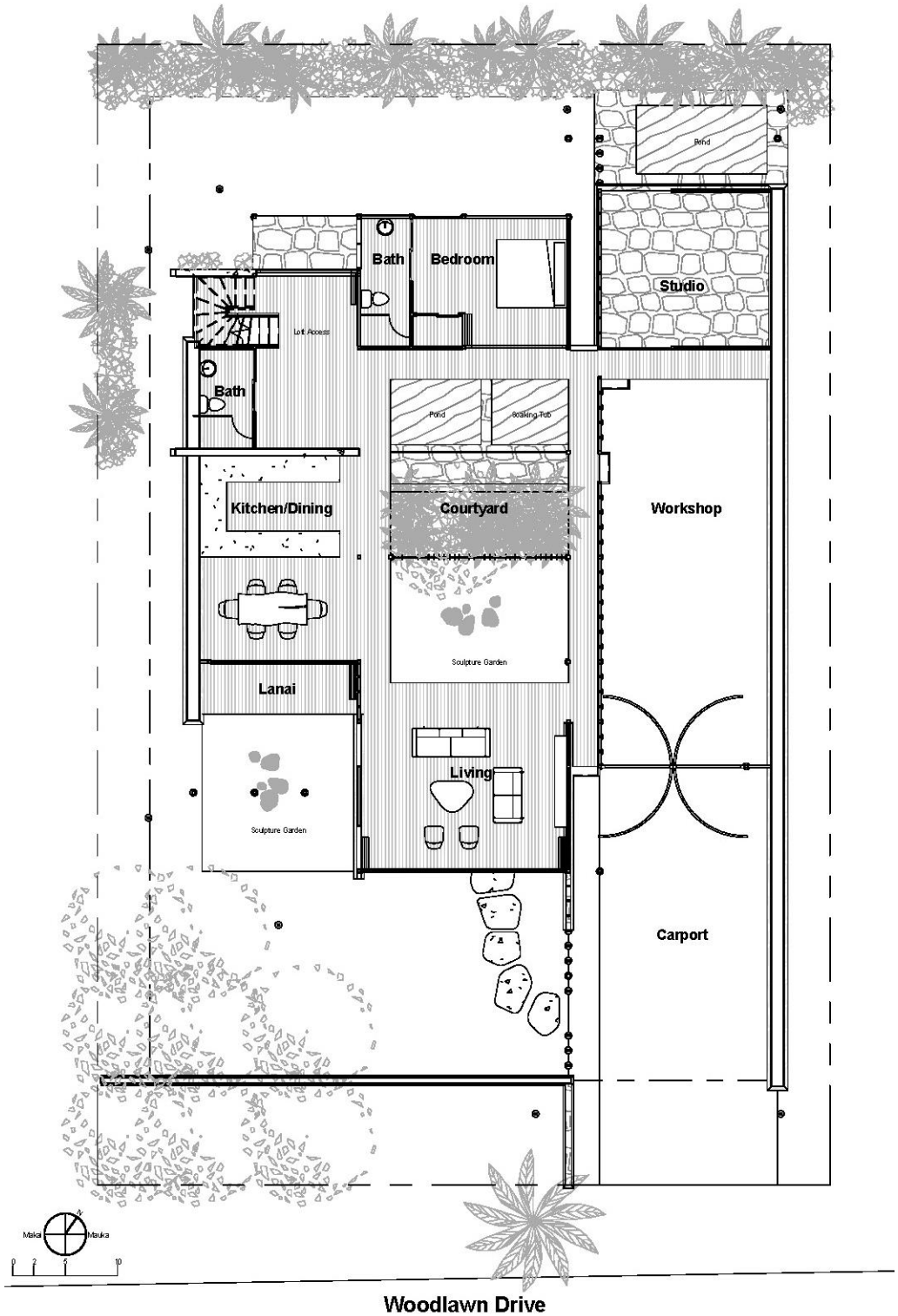


Fig. 300. Project A, *Level 1*. Scale: 1/16" = 1'-0"

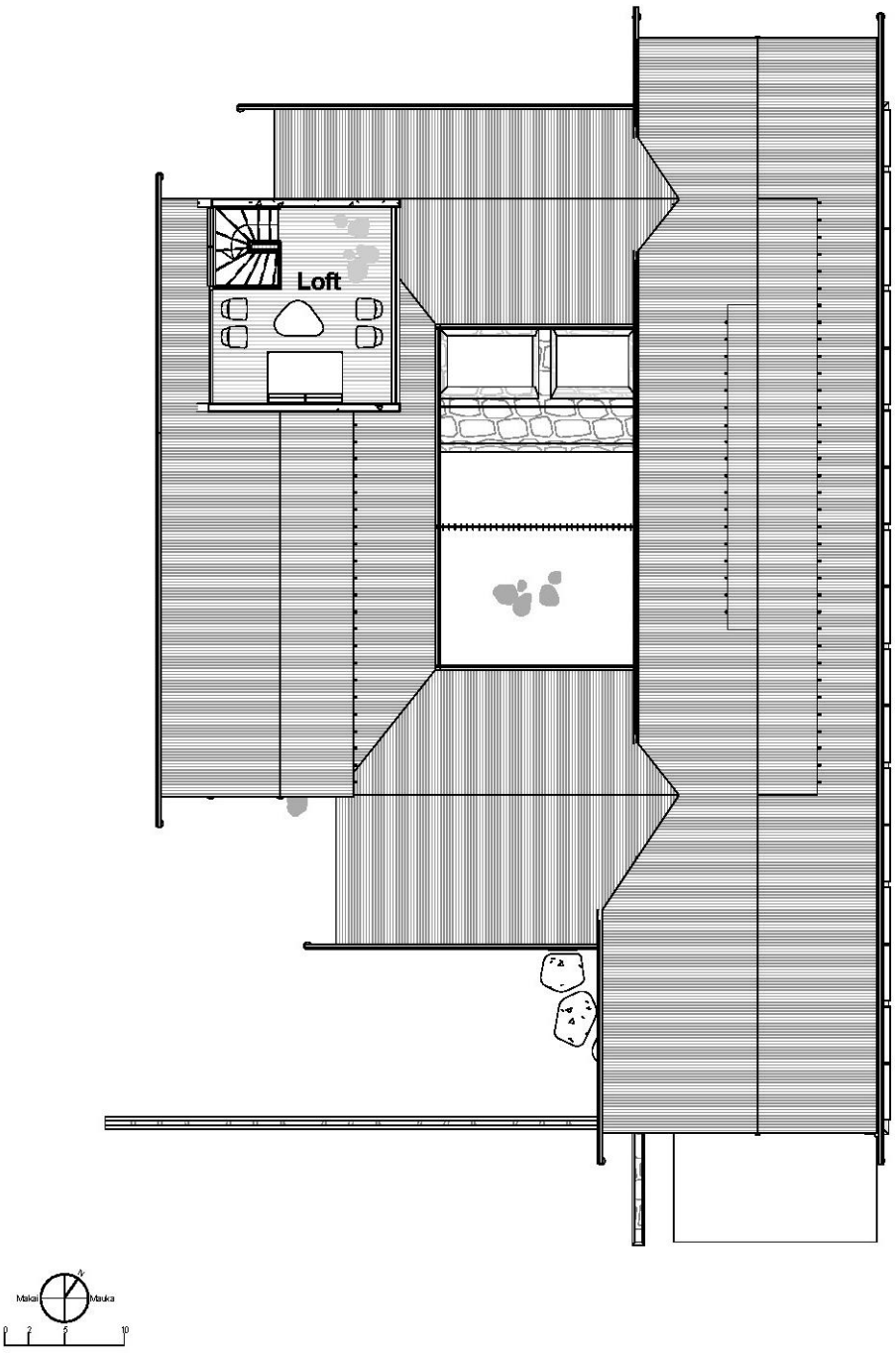


Fig. 301. Project A, *Level 2*. Scale: 1/16" = 1'-0"

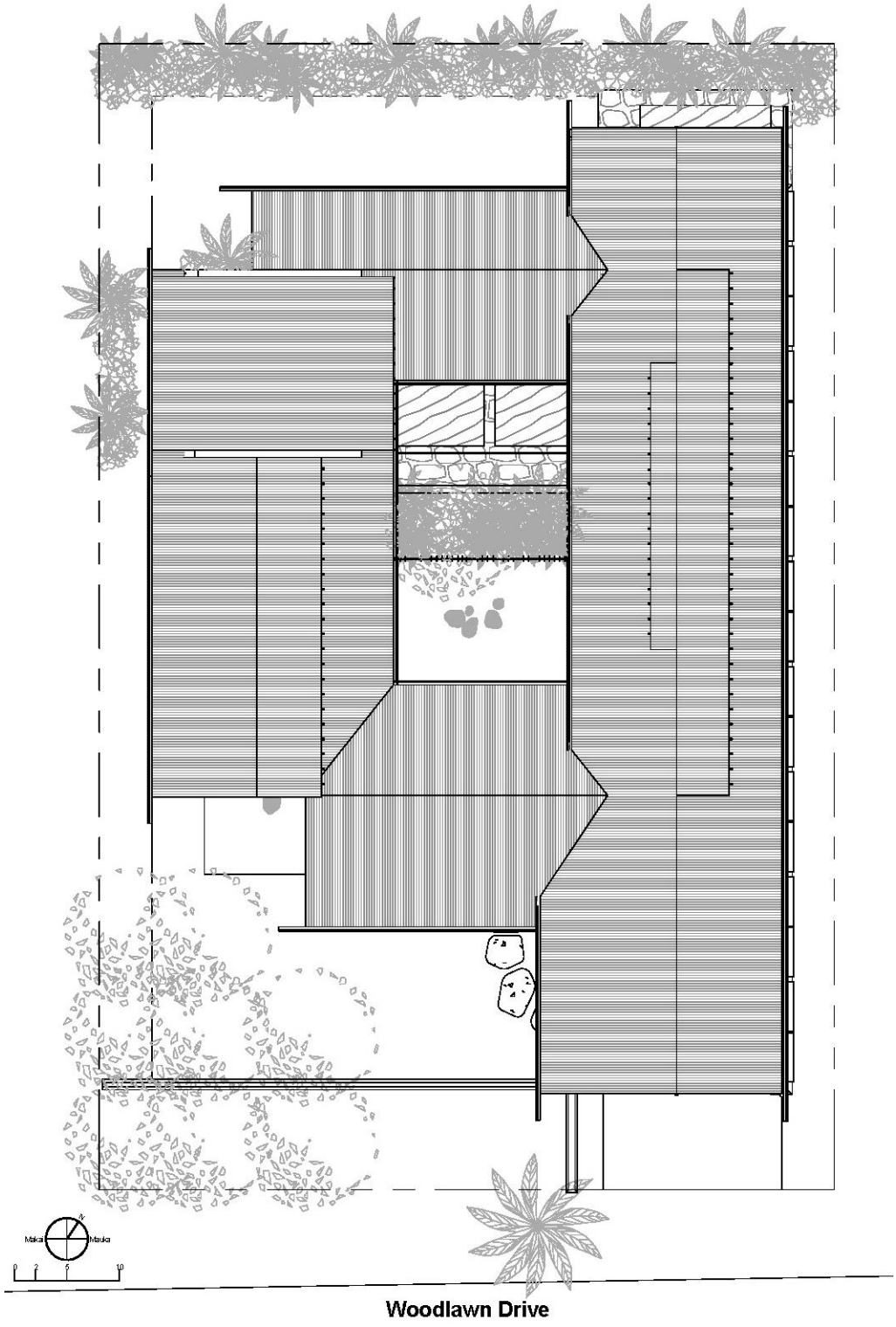


Fig. 302. Project A, *Roof Plan*. Scale: 1/16" = 1'=0"

Elevations

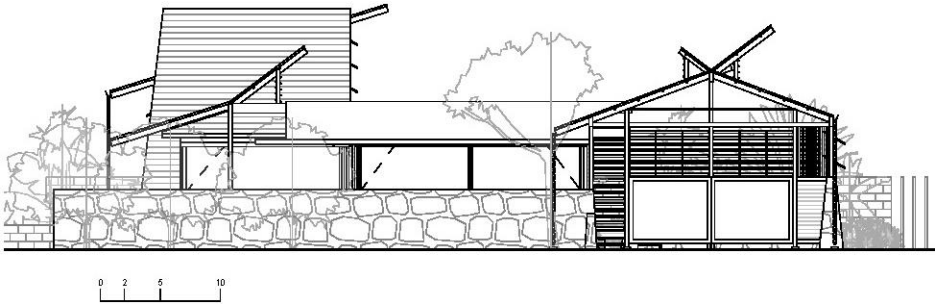


Fig. 303. Project A, *Diamond Head Elevation*. Scale: 1/16" = 1'-0"

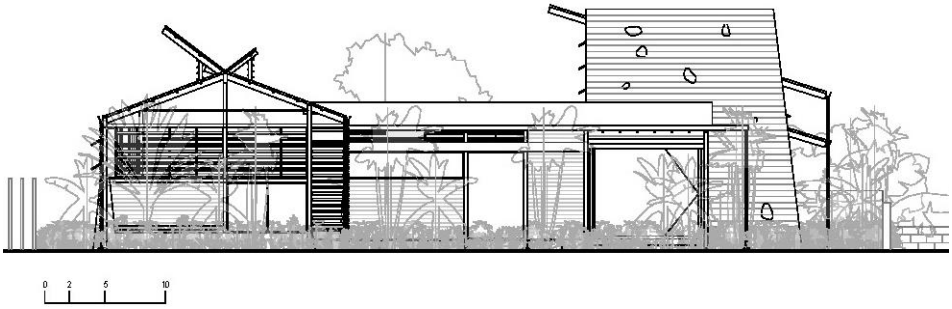


Fig. 304. Project A, *Ewa Elevation*. Scale: 1/16" = 1'-0"

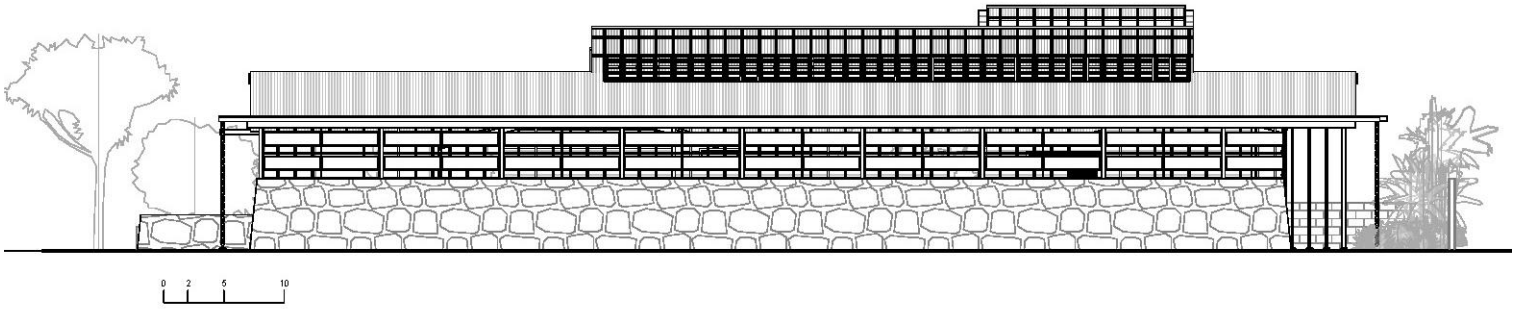


Fig. 305. Project A, *Mauka Elevation*. Scale: 1/16"=1'-0"

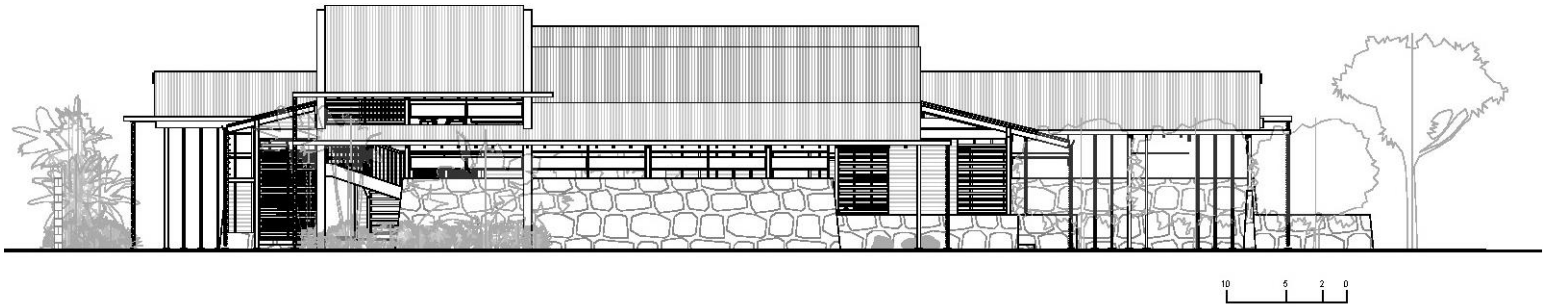


Fig. 306. Project A, *Makai Elevation.* Scale: 1/16" = 1'-0"

Sections

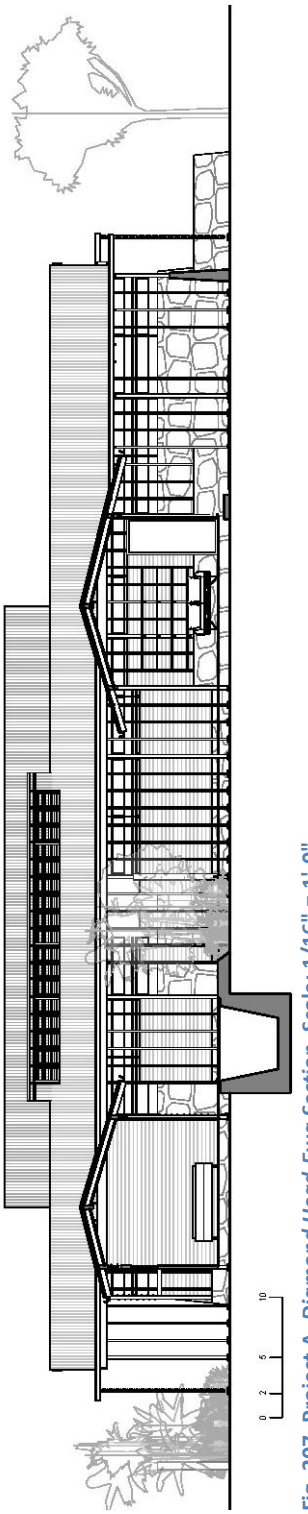


Fig. 307. Project A, *Diamond Head-Ewa Section*. Scale: 1/16" = 1'-0"

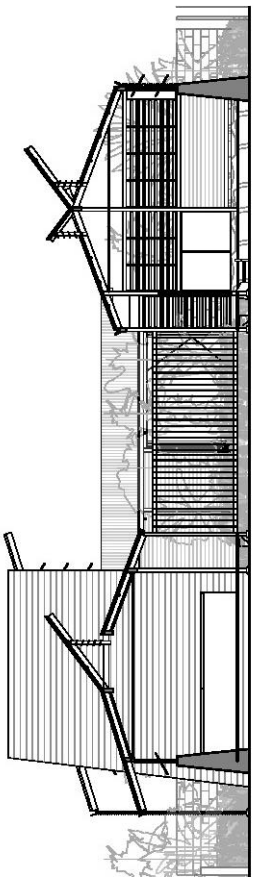


Fig. 308. Project A, *Makai-Mauka Section*. Scale: 1/16" = 1'-0"

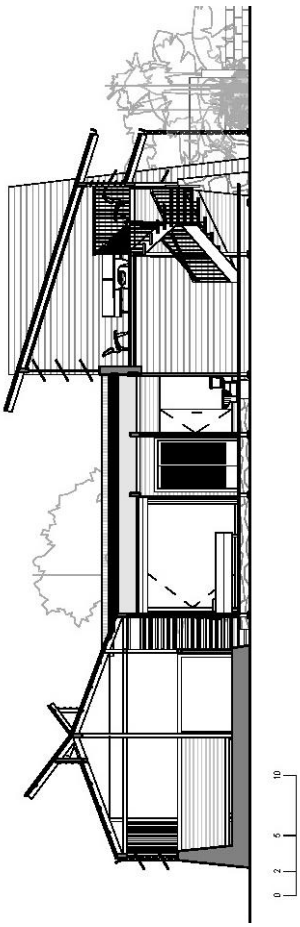


Fig. 309. Project A, *Mauka-Makai Section*. Scale: 1/16" = 1'-0"

House

Fig. 310. Project A, *Birds eye view*

Fig. 311. Project A, *View from Woodlawn Drive toward Tantalus Mountain*

Fig. 312. Project A, *View from rear toward Wa'ahila Ridge*

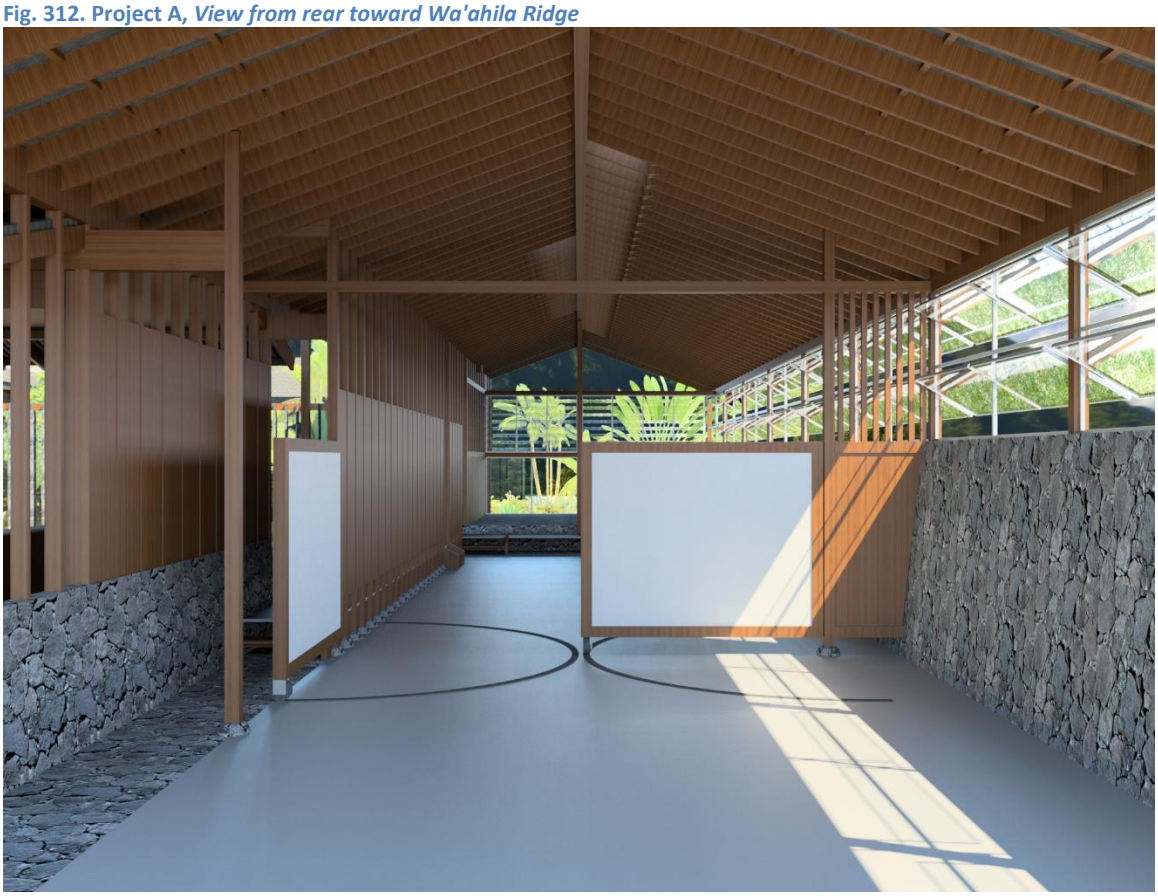


Fig. 313. Project A, *View through Garage to Workshop and Studio*

Fig. 314. Project A, *View from entrance towards kitchen and loft*

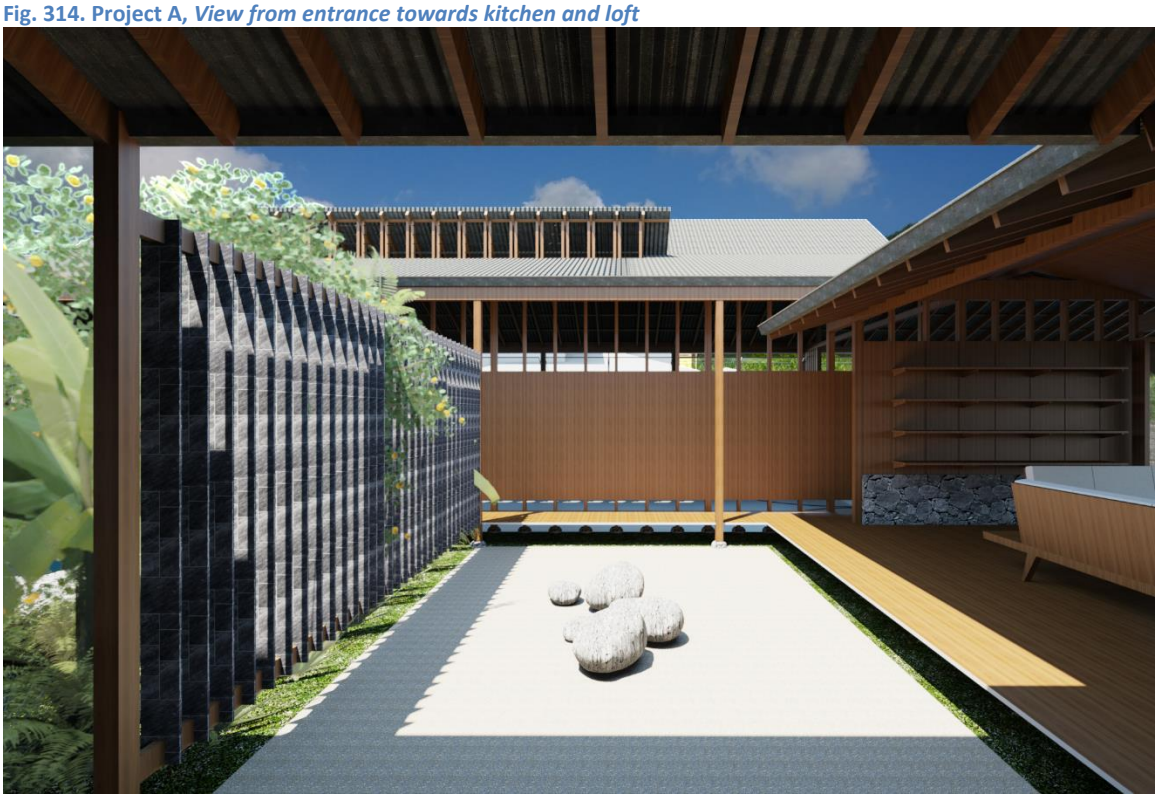


Fig. 315. Project A, *View from kitchen into courtyard*

Fig. 316. Project A, *View from bedroom into the courtyard at Wa'ahila Ridge*

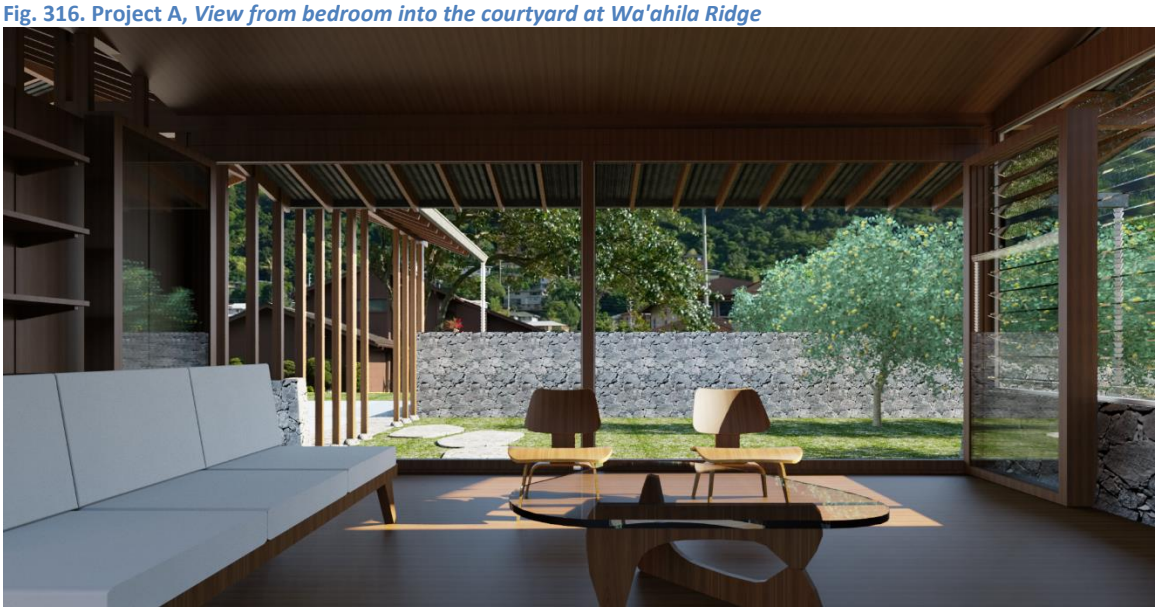


Fig. 317. Project A, *View through living room toward Woodlawn Drive*

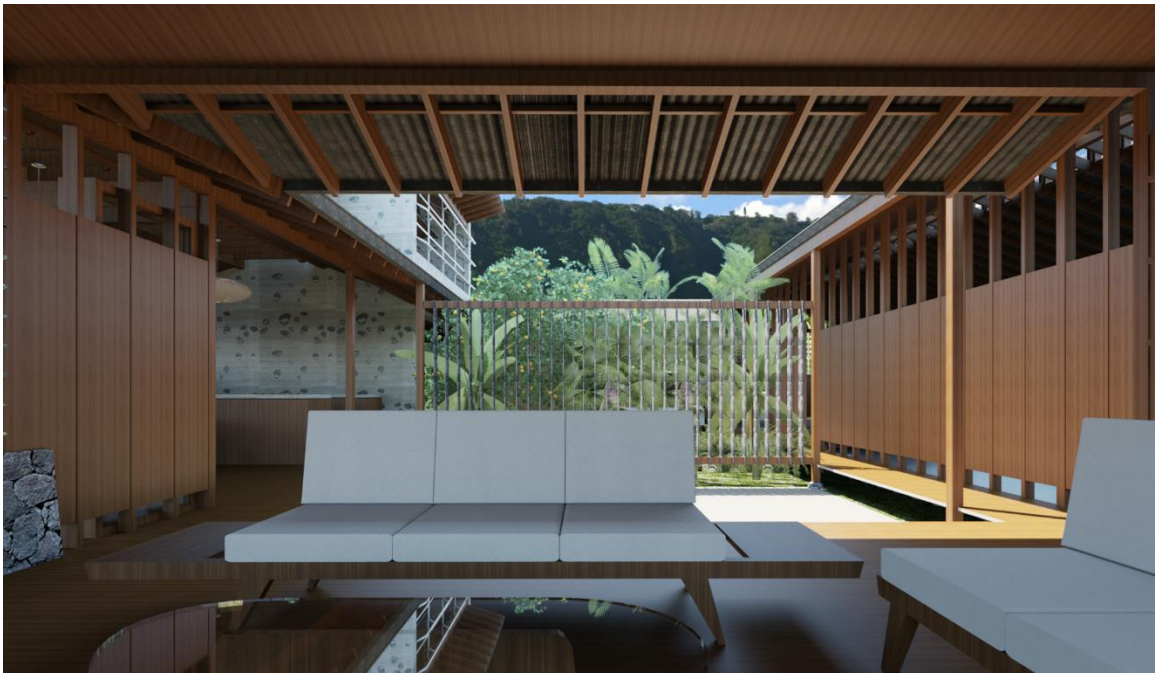


Fig. 318. Project A, *View through living room toward Tantalus Mountain*

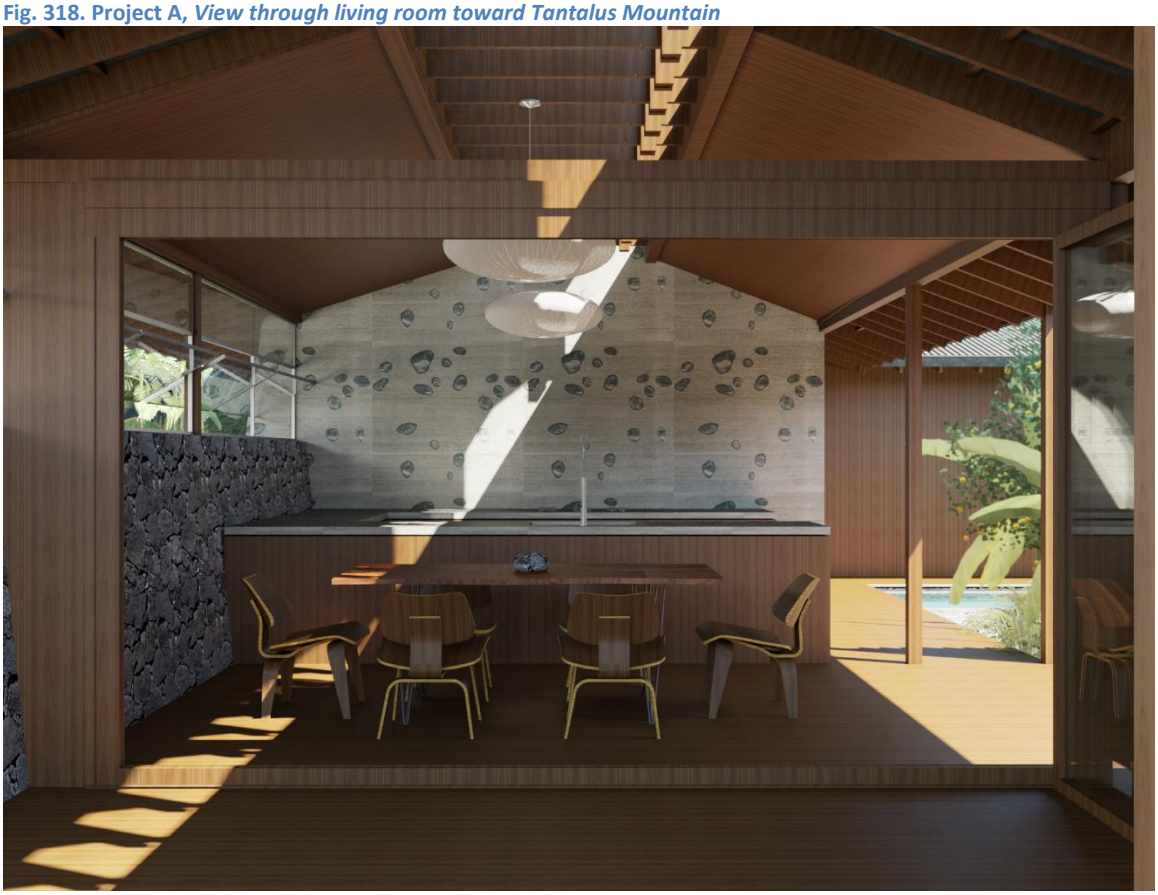


Fig. 319. Project A, *View from lanai to kitchen*

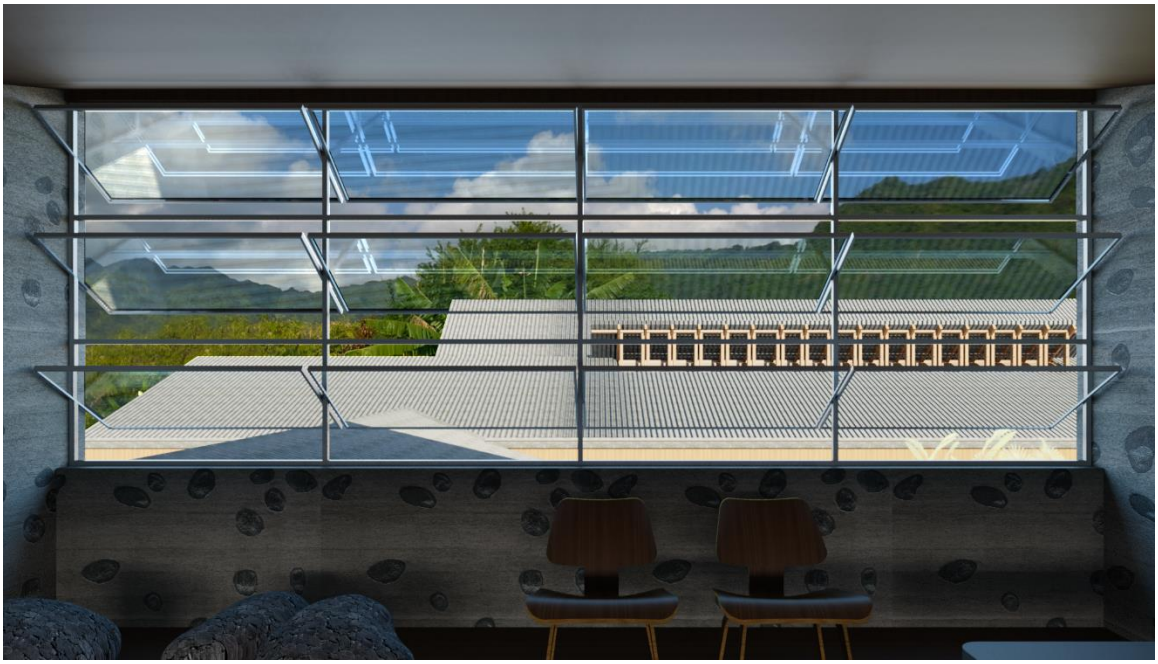


Fig. 320. Project A, *View from Loft to Kōnāhuanui*

Project B: 917 Hauʻoli St

Goals

The intentions of the project are divided up into two factors or categories, the client's goals, and the goals of the site. This client was chosen to ideally have different goals than the first client to better illustrate the research in this dissertation. Because the client's goals were different, the site was different as well.

Client – Wei Fang

Wei Fang is an urban community and arts manager who wants a place for herself, her family, and family friends to live communally. A cooperative condominium complex were social interaction is encouraged and the units feel more like an urban village than separate apartments. A place where she, her partner Lindsay, and their friends and family can age in place, creating a multi-generational home in a walkable neighborhood. A refuge in the city with all the benefits of both nature in Hawai'i, and proximity to urban attractions.

Site – Hauʻoli Street, Mōʻiliʻili

Mōʻiliʻili was once a lush vegetated tropical area filled with fresh water ponds and streams. Now Mōʻiliʻili is an urban mid density neighborhood centrally located in walking distance to many amenities and transit. Because of the microclimatic change over the years due to development, the neighborhood is hot and crowded. The age of the neighborhood means that many older structures are slowly being torn down and sites redeveloped for newer mid-rise apartment buildings. This site on Hauʻoli is one of the few empty lots in the neighborhood and is on a street with much mixed-use character.

Syntax/Context

The syntax and context work hand-in-hand where elements of the context – ordered in Seckel's factors for regional design – are understood through analysis creating the syntax, or order, for which the design should follow. The only additional factor to Seckel's list, is program, which is a starting factor for deciding the syntax and order.

Program

The spaces were determined by client and were the result of this communal living idea in her goals. The design would then be for multiple units, meaning multiple families. The units would all need common programmatic requirements of urban apartments, like two bedrooms, a living room and kitchen. But the idea of communal living meant more public spaces, more places for social interaction, and a shared respect for the building and each other's space. Lindsay, Wei's partner, is a chief by trade but works currently on a farm and wants space to grow food on property and be connected with nature.

The typical apartment unit is spatially configured like this (Fig. 321). Main entry is off of the living room lanai, and all rooms connect through that space. Elevator access to each unit is important as the clients parents are expected to live in one unit, and climbing up and down stairs would be difficult for their age. The elevator connects to the lanai as well. Two bedrooms are separated by a shared bathroom for the unit. The kitchen is at the other end of the unit connecting to the social aspect of the lanai. The kitchen is the center of most homes in terms of activity, and here it oversees the lanai area. Changes in this typical plan depend on the floor and orientation, but in general, all units need this minimum programmatic needs.

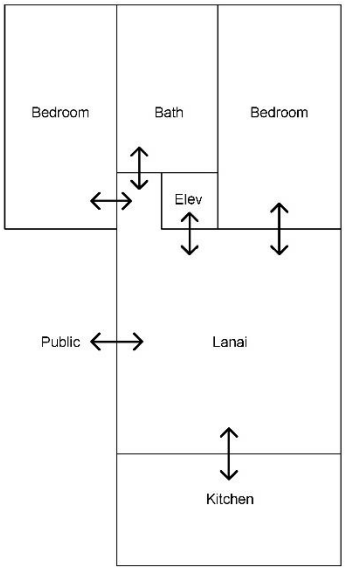


Fig. 321. Project B, *Typical Unit Program Diagram*

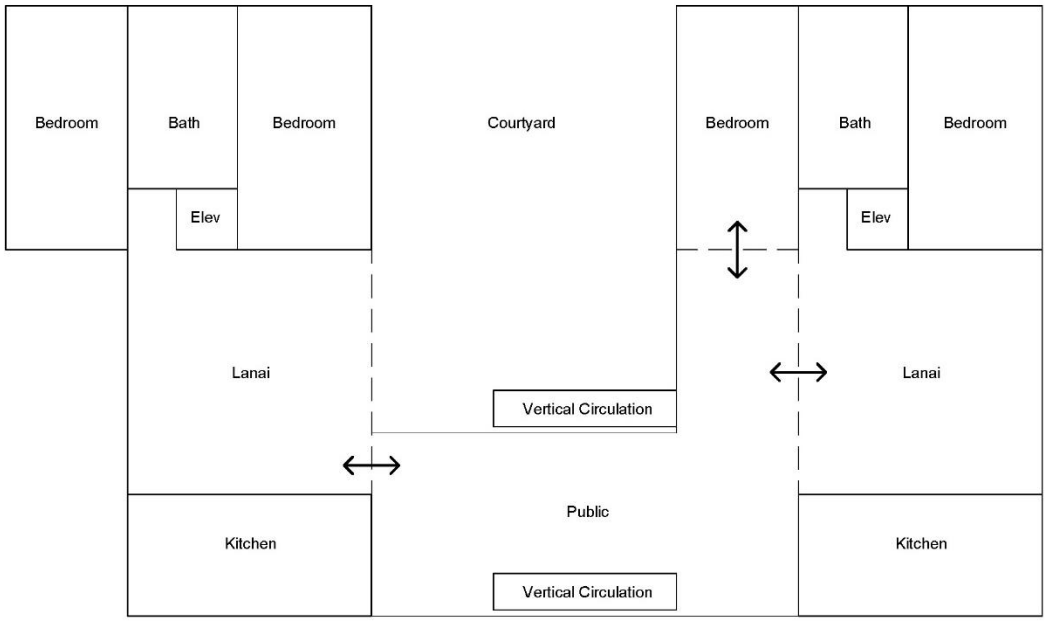


Fig. 322. Project B, *Unit to Public Diagram 1*

These typical units combine with a shared public space in the middle (Fig. 322). Rather than putting them side by side, they are pulled apart and the main vertical circulation is in this space. Each unit's lanai opens up to this public space, creating a front porch like relationship where when neighbors are coming to and fro the property, people pass each other and social interaction is encouraged. This public space also becomes an area for gathering, playing and growing plants. A central courtyard then creates a visual interest point for bedrooms on either side, while providing privacy from unit to unit. On the right unit in this diagram, the second bedroom can have its own access to this public area, making it ideal for multi-generational families in one unit.

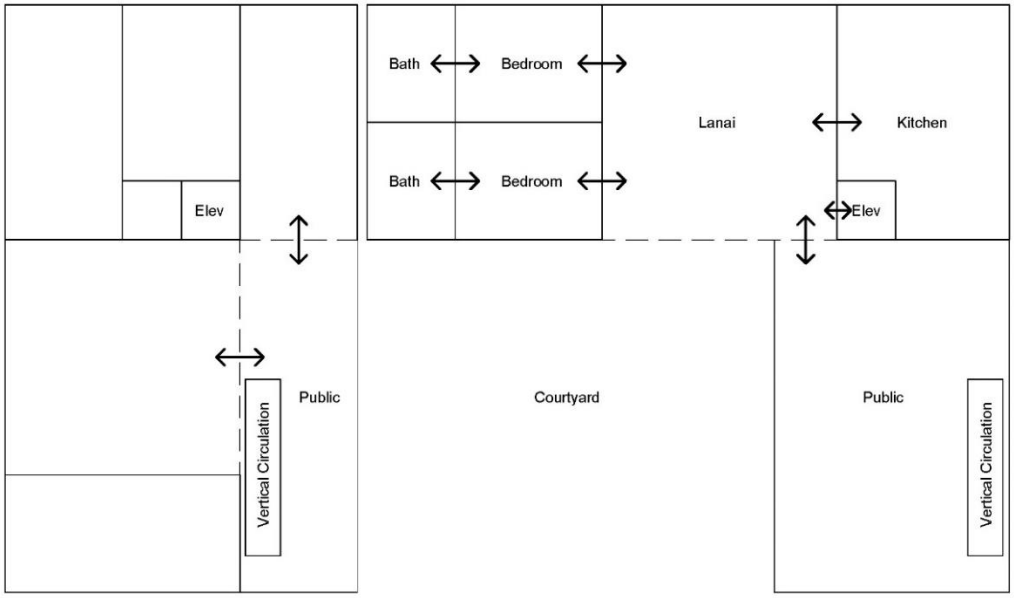


Fig. 323. Project B, *Unit to Public Diagram 2*

Another configuration of units to public space is exampled by the diagram above (Fig. 323). The typical unit plan is mirrored with the second bedroom on its right side (left unit). There is still access from its lanai and second bedroom to the public space. However a different unit plan represents the right unit. This is a linear orientated unit, but spatially shares the same connections to spaces as the typical unit. Bedrooms and kitchens connect to the lanai and the lanai connects to the public space and elevator. What this change in unit orientation does, is it open up the courtyard and public space to a larger area. Each unit has the same square footage in terms of lanai, kitchen, and bathrooms, the bedrooms are the only changes in size. The added benefit of the smaller bedroom however is private bathrooms.

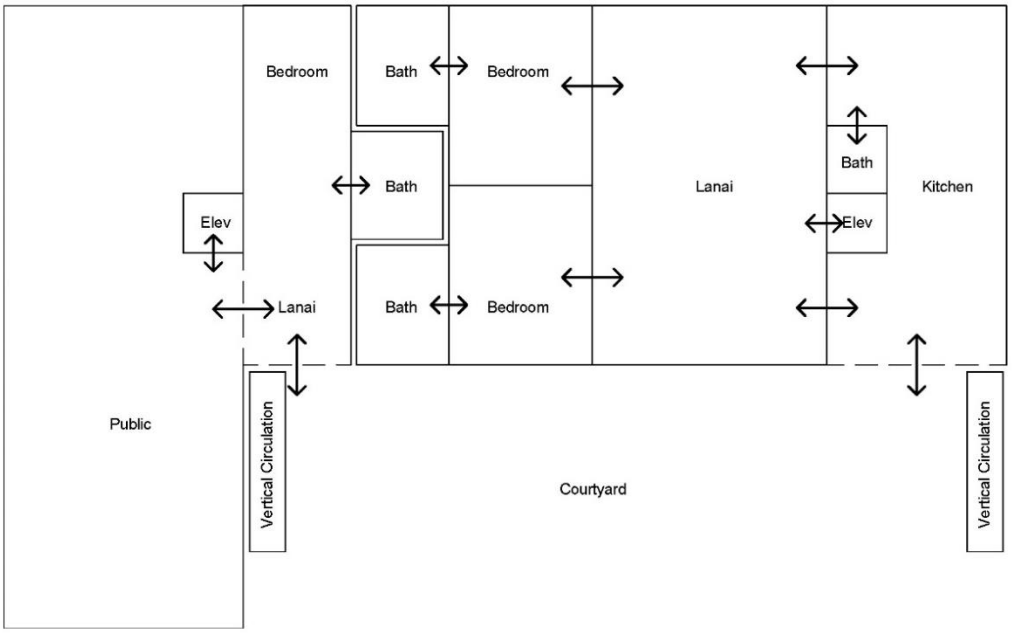


Fig. 324. Project B, *Unit to Public Diagram 3*

With this second, more linear, unit type a third type can be added to its end to make yet another configuration of spaces between unit and public space (Fig. 324). To increase chances for interaction and create flexible spaces that accommodate for different types of users within one family, public space programming changes depending on size and orientation. The third unit type that is added is a studio apartment. This variation of unit types increases the demographic possibilities for this housing complex. It doesn't limit the complex to only families, but also singles or couples – members of the family who don't need as much room. Studio apartments could be made out of the second bedrooms of the typical unit plan that have their own private access as well. The intention is to give the users flexibility in the design of when units are one bedroom, two bedroom, or even three. The idea is that it's a shared building and because of the cooperative living environment, resources and spaces are collective.

In terms of public, communal amenities, there are spaces for the collective whole to use that their private units might not have, either in terms of space or function (Fig. 325). One floor has the focus primarily on the communal spaces of the building. The layout still situates around a central courtyard, but amenities include a community workspace and a community kitchen. The workspace is intended for those users of the building whom work from home, like the client, and want a space to work in or bring clients to meet in. It can also double function as an event space for group parties. The kitchen is larger than the standard unit kitchen as gives more space for community gathering. Parking is also a necessity, and though the intention is to lean off of automobile dependency, there still needs to be two stalls per unit. Because there are six units, that means twelve stalls.

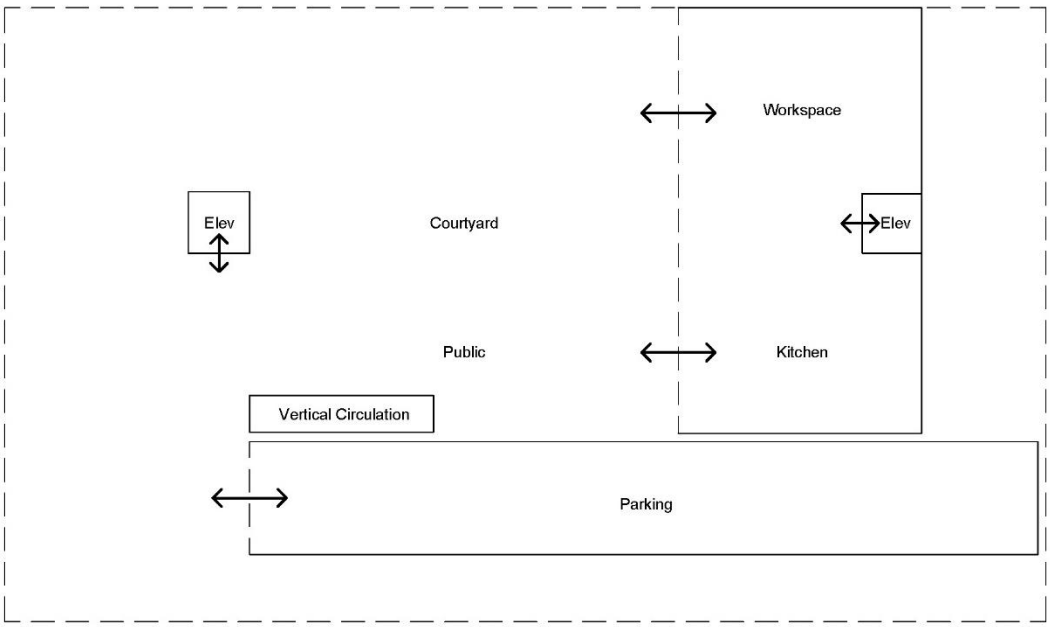


Fig. 325. Project B, *Public Amenities*

How these different floorplan layouts work in layers is by connecting vertical circulation and open courtyards to create varied spaces from floor to floor – as seen in the diagram below (Fig. 326). On the first floor (1), open space is joined with a one and a half story parking volume. Elevator shafts are then offset from the parking mass to give an entry space to the building. Half

a level up (2), the public amenity floor is joined next to the parking mass and the rear elevator shaft. Due to flood planes on the site, the space is lifted five feet above grade. Above the parking mass the two typical floor units are positioned around the elevator shafts (3). The roof of the parking mass becomes a public space for this floor, as well as the front unit creates a covered area underneath for the entry. One typical unit and one linear unit are then layered on top of those units (4). The roofs of the units below make public spaces for these units. On top of that another linear unit is stacked, along with one studio unit (5). The units below make public spaces for this floor.

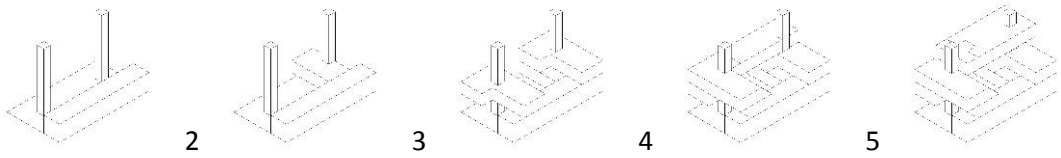


Fig. 326. Project B, *Massing Sequence Diagram*

The intention behind this stacking is to create public outdoor spaces on each floor on the roof space of the units below. These roof spaces could be used for community gardens, gathering spaces, or spaces for kids to run around and play. In essence this is the introduction to the overall design – the stacking of program informed shape, but function and orientation of these masses was determined by aspects of the client and the site.

Climate

The micro climate of Mōʻiliʻili is rather hot during most times of the year. It lies makai of Mānoa valley, where Project A's site is located. Though it is just a short drive away and no more than three miles, the climatic conditions are vastly different. As true for most areas of the island, the prevailing winds come from the North East direction – here in Mōʻiliʻili and Mānoa, roughly mauka to makai. But because of the Koʻolau range the moisture laden air from the Pacific is squeezed out and pours rain on the windward and mauka areas of the island. Mānoa is mauka, Mōʻiliʻili, is more *kula*, the area between mauka and makai. Rain storms are usually spent out by the time they reach Mōʻiliʻili, and therefore aren't as plentiful or heavy annually.

Because of the lack of rain, and harsh tropical sun, not much vegetation grows in this area – and because of dense development, the area suffers from urban heat islanding. Minimal green space and a surplus of asphalt and concrete make for radiating surfaces that reflect the heat from the sun back into the neighborhood.

What is interesting, however, is how the microclimate of Mōʻiliʻili used to be vastly different. Where Mānoa is fed with water from almost daily rain storms, Mōʻiliʻili was once fed by underground water sources. The water that rained mauka of the area either came down the valley in streams or seeped into the soil and collected in underground aquafers and lava tubes. Spring still exist in the mauka areas, like the one at Punahou School and Mid Pacific Institute (Fig. 327).

Fig. 327. ***Map of Mō'ili'ili***

Once there was a large network of underground caves and lava tubes, Diamond Head of the site, labeled the Mō'ili'ili Karst (Fig. 327 - area outlined in blue). This underground waterway was fed by the Mānoa stream and other fresh water sources mauka of the area. In several areas of the karst, there were openings to the ground surface creating ponds and small pools. One of these ponds (A), called the Hausten Pond, was where they opened The Willows Restaurant. In the 1920s it was a lush tropical park with ponds filled with fish. In 1934 however, there was a cataclysmic cave in at a construction site near the intersection of what is now Kapiolani and University (B). This cave-in to the Mō'ili'ili Karst caused irreparable damages to the eco system. The cave-in blocked the water ways which fed out eventually to the ocean. It drained all of the water in the caves mauka of the site (B), including the ponds at Willows. Within twenty four hours the entire cave system was drained out to the ocean, and salt water started seeping its way upward. When the water system equalized the salt water evaporated leaving a salt deposit, ruining the soil. The Hausten Ponds were partially saved by lining the bottom of the pond with concrete. Since this date, other cave-ins in the area have been reported and since then most of the Mō'ili'ili Karst has been filled in or capped over with concrete.[210]

What this accident did to the climate of the area is that it irreparably changed it from a vegetated area fed by underground water sources, to a dry area with infrequent rain showers.

[210] Halliday, *History and Status of the Moiliili Karst, Hawaii*

To add to this, since the change in climatic conditions and urban development, the area has been increasingly developed more as a mixed use mid density area. Few parks and green spaces remain, and what remains of waterways are now merely drainage ditches. Because of its low altitude however, the area still resides in the flood plain. All living spaces by code have to be elevated three feet above grade.

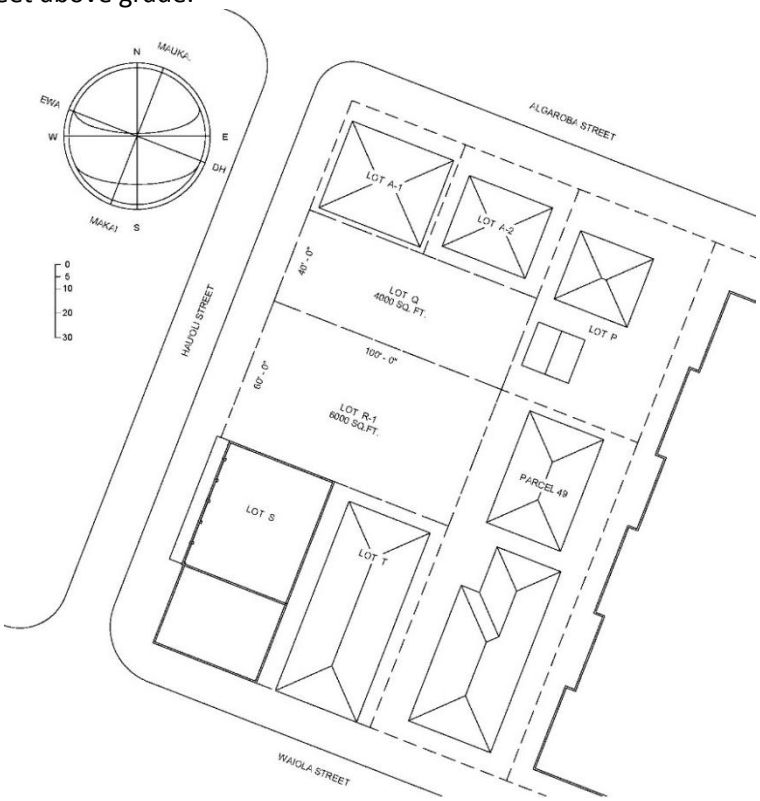


Fig. 328. Project B, *Block Plan*

In terms of onsite climatic conditions, Hau'oli Street, the street which the site is located on, runs mauka to makai, parallel to the prevailing wind flow (Fig. 328). Because of the mid density context however, these trade wind breezes are not felt on the ground level, but presumably exist above the surrounding neighbors. The tallest adjacent neighbor is three stories in Lot S. Breezes probably exist above this height. All other adjacent structures are two stories in height. Because of the climate of Mō'ili'ili, the site gets rather hot, and because of the angles of the sun in comparison to the site, shading requirements are need on the Ewa, Makai, and Diamond Head sides of the property. Mid-summer sun rises past the East-West axis but due to a seven story building Diamond Head of the site, shading is provided during these morning hours on the mauka side.

Setting

917 Hau'oli St currently refers to two lots. Lot Q and Lot R-1 (Fig. 329). The client, with a development company that she is involved with, is currently redeveloping the lots to create a nine unit condominium building. For the purposes of this dissertation, the 6,000 square foot Lot R-1 was chosen to design a six unit condominium building, in an attempt to keep the project to a reasonable size and constraints. That being said, currently there are no structures on either lot, but the most prominent built structure that has an effect on the site is on Lot S, the three story Saimin Factory. The majority of the neighborhood is two story walk ups of a mid-century style.

Mō‘ili‘ili is sprinkled with occasional high rises and even single story cottages in some areas. Diamond Head of the property is a seven story apartment building that spans the length of the block. This mixed use, mixed density block is typical of the surrounding blocks. Lot R-1 is 100 feet in depth and 60 feet in width. There are zoning setback requirements as it is zoned for residential – meaning that there is a 10’ front set back and 5’ side and back set back. Making the buildable area 85’ in depth and 50’ in width. The height limit however is 150 feet.

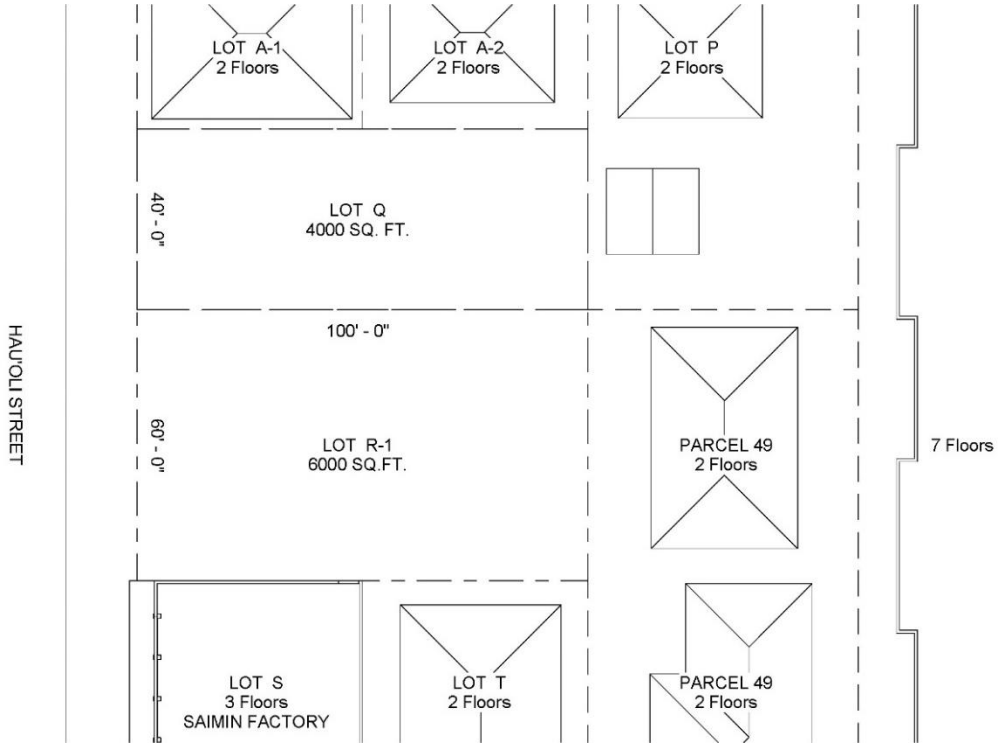


Fig. 329. Project B, *Lot Plan*

The saimin factory, Okahara’s, doesn’t follow zoning code for the area. It is built on the property line with no setbacks on any side. It does feature a party wall built up to the three floors of the building and a front awning that runs along the sidewalk. The elevation below (Fig. 330) shows the profiles of the two structures makai of the lot. The building in Lot T (shown on the left of the elevation), is typical of the surrounding structures as it is a two story walk up with parking on the first level.

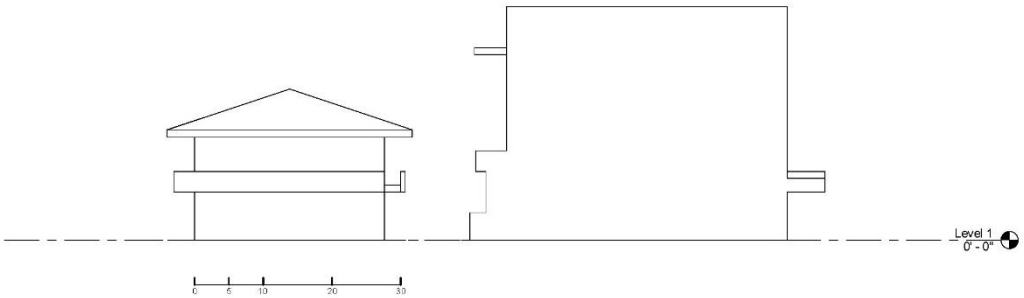


Fig. 330. Project B, *Elevation Makai - Existing Conditions*

The lot is fairly flat, with no real elevation changes. As seen in the picture (Fig. 331), the street has a very urban feel to it with overhead power lines and graffiti on the side of Okahara's. Along the street side of the property there isn't a real sidewalk, and currently it is being used as off street parking by the neighbors. Okahara's has loading docks facing Hau'oli Street and their street corner structure has little in terms of a face. The only views on the site are mauka, but those cannot be seen unless from a vantage point above the surrounding structures.

Fig. 331. Project B, *View from Hau'oli Street*

Isolation

Currently the clients live in Mānoa, not too far from the site for Project A. However, because of their jobs they both have to commute out of the valley to go to work. Lindsay works on the windward side of O'ahu and leaving the valley at peak hours due to school traffic can sometime take quite some time. That is why they both prefer to live in a neighborhood like Mōʻiliʻili. Though it is one of the older neighborhoods of urban Honolulu, it is less kept up and will foresee much development in the next decade. It is ideal, however, in terms of its location in proximity to other parts of Honolulu. It is just mauka of Waikiki, makai for Mānoa, and situated between the H-1 freeway and Kapiolani Blvd – both which run parallel to the shoreline and crosscut through most areas of Honolulu. The site is also two intersections away from King St, and parallel to that, Bertania St – two other streets that run parallel to the shore and cut into downtown Honolulu. This site is well situated off of some primary access arterial roads of the city.

In terms of the closer amenities and context, many shops and restaurants border King and Bertania streets. A major grocery store is also just a few blocks away and within walking distance. Bus lines go up and down these major streets, and recently a designated bike lane opened up on King St. Ideally, it is quite possible to live in this neighborhood and have no need for an automobile. Most necessities are within walking distance, locations further than that can be reached by bicycle along King St, and downtown and other areas past that are just a short

bus ride away. It could turn out to be a very walkable and friendly neighborhood. The only issues now is its environment and lack of streetscape.

Currently Wei and Lindsay both own cars, ideally they would want to be a one car family. With Lindsay working on the other side of the island though, his need for an automobile is vital as of now. Also, because they currently live in Mānoa, Wei would be more or less stranded without a car to get to work or into town. If they lived in Mō'ili'ili their need for an automobile could be lessened and one, or both could start using bikes and public transit as their main means of transport. By code however, there is a minimum need for parking stalls on site per unit in the design. It would be great as the users start transitioning to bicycles that there are less cars parked on site, this space can then be reclaimed for the rest of the cooperative.

In terms of isolation, as well, the biggest thing that this site is isolated from is nature. It is not in a valley with mauka views and it is not close enough to the water for makai views. It is in the middle where density has swallowed up park and green space. And after the change in microclimate in 1934, the area has had issues of heat and lack of vegetation. Reconnecting the client and users with nature would be a vital part of the design, otherwise it would be like any other multi-family building in any other city.

Cultural Background

Client

Wei Fang is originally from Portland, Oregon. She has lived in large cities like New York and London for several years before moving to Honolulu. She is of Chinese /Taiwanese decent. Her parents are from Taiwan and still live in Taipei for half of the year. The other half of the year they live with Wei and Lindsay at their Mānoa apartment. Wei also travels yearly to Taipei to visit friends and family. They always seem to be having guests at their house staying in their extra bedroom. Either Wei's parents, Lindsay's family, or other friends or family are always staying for days on end. Ideally there would be a unit in the complex for Wei's parents to live in when they are in town. The other units would be filled with other members of both families and close friends.

Wei got her college degree in art theory and critique. In Honolulu she helped found Interisland Terminal, a local art, film, and design organization. They showcase local designers and artists through various venues and perpetuate the idea of indigenous international. To them, that phrase means bringing in work to the community that deals with indigenous local issues and topics that connect on an international level. One of the projects that Interisland Terminal worked on was the opening of a community public space called Kaka'ako Agora. Kaka'ako Agora is an indoor park in the former warehouse district of Kaka'ako, an area that is currently under much redevelopment with high rises and mixed use living in the works. Kaka'ako Agora resides in one of the former warehouse spaces and is a venue for social gathering, events, and a variety of publicly hosted collaborations. The idea behind it is to help build the urban community in this area of Kaka'ako and provide a venue that can act as a hub for an up and coming art scene. The design of Kaka'ako Agora was done by Japanese architecture firm Atelier Bow Wow, under architect Yoshiharu Tsukamoto. Wei and Interisland Terminal worked closely with the firm to create this urban community space in a way that it could be crowd funded and free to the public. Much of Wei's work and culture is about building this urban community and engaging different aspects of art and energy in a city.

The project that she is working on currently at the Hau'oli site is with architecture firm Tadpole Studios. Their intent is for a development project that will give a new energy to the Mō'ili'ili neighborhood in terms of lifestyle and building typology. Their units are two to three bedroom and are two stories. Each unit has a main floor and a second floor loft area, creating volumes of large ceiling height. Their design is intended on resale, not for them to live in, so this key difference changes the two ways that their design, and the design undertaken for this dissertation, will result. The intent behind the design for Project B in this dissertation is to make a personal statement and expression of the client's lifestyle and culture.

Wei's partner, Lindsay, is from the mainland but has many ties to the Big Island of Hawai'i. He has family there and has lived there and on O'ahu at various times during his life. He is trained as a chef but currently works on a farm on the windward side. Because of his current occupation he realizes that there is a lack of a connection to nature in the city. During a meeting with Wei and Lindsay he expressed a desire to live out in the country so he and his future kids know what it is like to be in nature. Some of the kids that come to visit the farm he works at are afraid of dirt and have never gotten dirty. An intention of this project then should be to connect people living within an urban community with nature and agriculture. Also because Lindsay is a chef, he expressed a want for an industrial grade kitchen. Cooking is a part of his culture and lifestyle and this should be expressed in the design.

Their current apartment is furnished quite minimally and in a modern fashion. They both try to purge of the excess things in their house and prefer quality to quantity. Lindsay's desire for an industrial kitchen and Wei's desire for a stark minimal aesthetic would bring them to a design that is furnished based on function over excess. They have no television and spend their time at home either entertaining guests, cooking, working or sleeping. A Spartan interior is ideal to keep clutter down and create an open feeling for guest to enjoy.

Site

The cultural background of the site is in many ways ties back to the change in microclimate in the 1930's. Prior to the construction accident that drained the underground caves in 1934, the area was a tropical paradise, owned by prominent figures of Hawaiian history. The area of Mō'ili'ili was originally named Kapa'akea after the High Chief Caesar Kaluaiku Kapa'akea who ruled the Kingdom of Hawai'i in its last days and was the patriarch of the Kalakaua dynasty. His children were David Kalakaua, Lydia Liliuokalani and Miriam Likelike. The area of Kapa'akea was formally of the Mānoa ahupua'a. The area was given by Kamehameha I to his father in law Ke'eaumoku. When Ke'eaumoku died in 1804 he passed on the land to his daughter, Ka'ahumanu. She later passed on the land to her daughter Kinau at that time of her death in 1832. Kinau was married to the Governor of O'ahu, Mataio Kekuanaoa. Kinau then passed on the lands to her daughter Victoria Kamamalu, who had summer cottages there.[211]

The area of Kapa'akea was known for its spring fed ponds, one of which was mentioned before at the Willows Restaurant. Commonly referred to as the Hausten Pond and spring, it was originally called the Kumulae Pond. Nearby, approximately around the area of Bertania and University Ave, was the Kanewai Pond. Both ponds were known to have healing properties.[212]

[211] Island Expat, *Hausten Pond at the Willows*
[212] Island Expat, *Hausten Pond at the Willows*

When Kamamalu died she bestowed the lands to Bernice Pauahi Bishop and the Bishop Trust in 1866. In the 1920s it became the home to Emma McGuire Hausten. Hausten lived in the area by Kumulae pond and became quite the gardener, mixing species of Pacific plants with Western varieties. Hausten later opened up the grounds that she gardened around the pond in the 1930s, letting people come and picnic on the property as the Hawaiian royalty had once done generations before. Hausten's pond was known for its large koi fish and the abundance of plant life (Fig. 332). Then the 1934 construction accident happened with its resulting cave-in and draining of the ponds. The famous fish were sucked out to sea within twenty four hours. Soon the microclimate of the area started to change and around the time of the opening of Kapiolani Blvd in the mid-century brought in much development and the area that was gardened by Hausten was diminished to the size of the several lots that make up Willows Restaurant.[213]

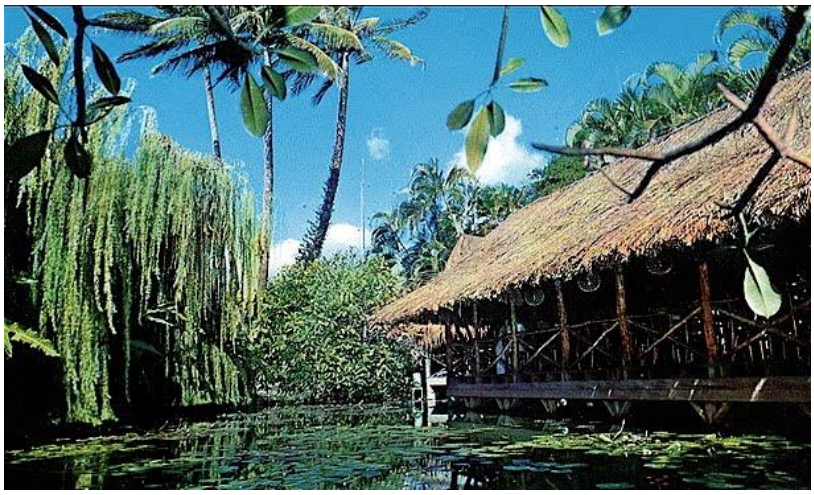


Fig. 332. *Hausten Pond at The Willows Restaurant*. Prior to 1954, Moili'ili, Honolulu, Hawai'i.

Much of the area then was developed around this time in the 40's to 70's. A variety of building typed appeared. Mostly two story walk ups that were cheaply built, but also occasional cottages and in the later years high rise condominiums. The neighborhood maintained some of its culture from prior to development. Areas along King Street were known for their many florists and flower shops, left over from the time of Hausten's horticulture days. To this day, few remain, but are still maintained thanks to universities and high schools nearby where graduation in Hawai'i culture means the exchanging of lei's to one another. Since its early development it has always been a walkable neighborhood with shops and restaurants. It also at some point had a street car that connected it with other parts of town along King Street.

Sprinkled throughout the neighborhood are some great midcentury modern gems. And even in the context of the block, most of the buildings were built during this period. Okahara Saimin Factory next door to the site ties the block back to the rich Japanese community that used to live there. Mōʻiliʻili is home to the Japanese Community Center and a large red Tori Gate marks the entrance to Mōʻiliʻili from the King Street entrance. There are several Japanese temples in the area as well Japanese schools and the area used to be known for its sake breweries. Mōʻiliʻili had a strong both Japanese and Chinese ethnic heritage though during this time.[214]

[213] Island Expat, *Hausten Pond at the Willows*
[214] Fujitani, *Oral History Interview*

Typologies

The idea of multigenerational, multifamily and communal living is not a new idea to the history of architecture in the tropics or Asia-Pacific area. It is slightly uncommon in today's development planning in Hawai'i to plan to have multiple families all living in one site. There is still the American mentality that as children grow up they should move out and get a place of their own and start their own families. However, this is often not the case for a multitude of reasons. Chiefly, economics. Land is at a high cost in Hawai'i and most of the cost for a new home is spent on purchasing the land – as was noted by Henry Seckel back in 1954, but even truer today.[215] The second reason for multi-generational families staying together in one house is a cultural reason. It is common in many Asian cultures for many different branches of one family to be living under one roof. This practice was carried to Hawai'i and still occurs today. In fact, a bill was recently passed making it legal to build a second unit on a property with an existing house on it in most residential neighborhoods. This second dwelling is called an *ohana* unit – ohana, meaning family in Hawaiian. Even in Hawaiian culture there are roots to multi-generational housing. The *kauhale*, or Hawaiian homestead was a collection of hale built to house one family, and the multiple generations that lived in it.

In the cultural background of this project, it is important to look at examples of multi-generational housing in the cultures associated with both the client and the place. Wei and her family are Chinese and descend from Taiwan. Chinese architecture has the multi-generational dwelling typology of the Chinese courtyard house, or Siheyuan. The Chinese courtyard house was built in dense cities and was shaped in a courtyard to give open space to the family that lived there. The courtyard house was more like a series of structures that orientated around a central open space along a North South axis. The main house along the street side, or northern side, was for the head of the house hold. Each wing, or side of the building was intended for different members of the family, like children, unmarried daughters and the servants that worked for the family. In terms of vocabulary however, it is interesting to note the covered spaces that wrap around the courtyard that were used as circulation during the day and was a place to admire views at night. There were also areas designed for the family to come together, play and relax.

Today in Taipei, many people still live with their extended families under one roof, but instead of traditional courtyard houses, they live in multistory buildings, treated as one house, but designed so that each floor is its own family unit. The first floor is usually planned with the most public space for the extended family, but also houses the grandparents of the family. The hierarchy of the family depicts which floor which member of the family lives in. There usually is one main entrance to the multi floor house, through a street gate and garden foyer. Integrating some vegetated area is important in a dense neighborhood.

The Hawaiian kauhale is also of importance to this typological study of the cultural background of this project. The kauhale was more of a homestead than a single building. Several hale were laid out in a predesigned layout dictated by the kapu system in ancient Hawai'i. Each hale was built for a specific purpose and the sizes varied depending on function. There was a separate hale for men and women to eat in and spend time apart in, but the area in the middle of the kauhale was called kōwā, and this is where there were no prohibitions of kapu, and the family

[215] Seckel, *Hawaiian Residential Architecture*

spent time together. In the center of this area was a kahua, which was an open area or platform that the family could play in.[216]

Materials

Board Formed Concrete

Cast-in-place board formed concrete is one material that was chosen for several reasons. One is structural reasons in that concrete structures allow for greater spans and greater heights. Also, its material properties help keep interior spaces cool in hot climates. The other reason is that it responds to the urban context of the area. Okahara Saimin Factory is a concrete and concrete masonry structure, as well as many other buildings in the area. Using concrete helps maintain the character of the neighborhood. Using board formed concrete, as opposed to other cast-in-place techniques, is to articulate the construction process of the material, showing that it was once in a liquid like state and it has now taken on the characteristics of stone. Using board forming honors the concrete material by expressing its building process.

Wood

Wood frameworks and lattices are used between areas of the concrete to add privacy and visual barriers in nonstructural areas. The wood relates to the board formed concrete in its imprint left from the formwork. Using the two materials also relates to the neighborhood as there is a mixture of concrete midrise buildings, and low-rise wood cottages and houses. Both materials are intended to play to the vernacular architecture of the area.

Environmental Living

Wei and Lindsay both expressed that they spend so much time in the city that they could be living in any city in the world and it wouldn't make much of a difference. There was no benefit in their day to day lives of living in Honolulu, or in Hawai'i. They hardly ever go to the beach, go on hikes, or go out and experience the natural splendors of island living. Lindsay's current job connects him more with nature while he is working on the farm, but if anything, makes him want to move to the country as opposed to staying in the city. The only time that the two of them together spend outside is while walking their dog at night. The design should encourage the environmental living possibilities of living in Hawai'i. Connect them back with nature, give them a view of flora, and let them feel the cool breeze coming through their house. Elements should be ordered to encourage this. Two organizing ideas are the lanai and rooftop gardens.

Lanai

A lanai as an organizing structure for this design means that units act more as wall less rooms, than enclosed apartments (Fig. 333). Because of the layout determined by the program, the units are designed more like open shelves allowing for maximum cross ventilation through the interior. However, this open air concept has issues of privacy in this urban setting so a screen of some sort needs to be placed on the street side of the building.

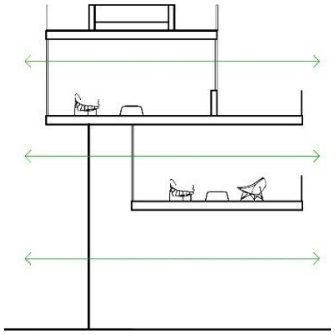


Fig. 333. Project B, *Lanai Diagram*

[216] See Appendix

Rooftop Gardens

The clients expressed a desire to have urban agriculture space and the ability to grow their own food on site. This client goal, matched with the cultural background of the site having a previous usage and notoriety for the areas many gardens and horticulture, points toward integrating the use of rooftop gardens. The stacking of the program creates multiple pockets of public space located on the roofs of floors below, this space could be used for vegetable and fruit gardens. These gardens not only immerse the building in pleasant visual stimulation, but also helps with the urban heat islanding of the site. Ideally, each unit would have their own plot of soil in which to grow their own food. These gardens could be private or communal depending on their location and orientation. Having rooftop gardens and urban agriculture is only possible through intensive participation from the users, creating the need for people to work the land like Lindsay had requested.

Economic Conditions

In terms of economic conditions of the project and budget, there are some interesting dynamics as opposed to Project A, where the client in no way could afford the property or the cost of construction, so academic freedom was taken. In this project, the site is already owned by the client but is being developed for resale not private use. Their budget is more reasonable in terms of materials, construction, and finishes. However, they also have nine units and use both lots. Because the design for this dissertation is intended for private use and not resale, the scope was taken down from the client's development to make it more realistic in terms of economy. This design only has six units and uses only one of the lots. Material and construction cost might be greater than the client's due to cast in place concrete, as opposed to the precast system in their design. Because this project is intended for private or more controlled sales, the priorities are different than a project intended for resale. Here we are designing for the client, the client's immediate family, and then other units sold to other family members and friends. The priorities therefore are about making the multi-unit building function as a whole, making space for family and community gatherings. In a project intended for resale it is about making separate units with equal amenities and personal features, less about shared amenities.

Vocabulary/Elements

The vocabulary, or elements, of the project come from the list presented earlier in this paper. With alternations do to configuration, and additions made, the following vocabulary are part of the Tropical Modern design language, but are all examples used on this design project only. They were chosen for their appropriateness and response to the various factors that made up the syntax and context description of this design.

The goals put forth by the site and client were then communicated through ordering sentences translating these goals. The sentence order was based on factors for regional design – like climate, material, culture, and environmental living. Words were then put into these sentences to give them visual communications. These words were different types of roofs, walls, and spaces that when put together told the story of different aspects of the site or the client. The previous section was the list of the various different words used in this design. Individually they come together to make up the language of the building. The design of the building in its totality is the data, or the final written sentence. In the following section, it is documented in typical architectural plans, elevations and sections. Following this depiction of the data of the house is the section on the final house itself, as seen through renderings and visualizations.

Precedent Architects

In designing this project, the first step in looking at precedents was to look at historical precedents of multifamily, multigenerational housing throughout the different cultures of the project and the tropics. These historical precedents were discussed earlier in the cultural background section of the syntax and context. They helped order the sentences of the design. The words however were derived from those precedents as well as others in the Tropical Modern design language.

Fig. 334. Marcio Kogan, *Paratay House.* 2009, Brazil.

Fig. 335. Angelo Bucci, *Casa Piscana*. 2010-11, Brazil.

Two architects that were brought up in the discussion of this complex were Brazilian architects Marcio Kogan and the firm SPBR – both previously mentioned in the vocabulary of Tropical Modernism section. Their work balances concrete modern forms with concentrated nature and aspects of environmental living. Marcio Kogan has mastered the concrete shelf living space, incorporating continuous rooms that flow wall-less from one space to the other. Either no exterior walls on the open sides of the shelf, or large sliding glass panels that can be pulled away to open the space out to the elements. He also has found other ways of screening in the open shelves, taking elements and vocabulary from the cultures of the projects. Whether it is reed lattice walls (Fig. 334), or artful breeze block, it creates a ventilated privacy screen from the outside, but maintains a connection to the outdoors from the interior. The porous walls become focal points of the designs as they stand out against the board formed concrete boxes. The architecture of SPBR is also innovative with their concrete structures in that they maintain a very pure geometry, like that of Kogan, but get creative with interlocking spaces that create hidden courtyards and private gardens. Like in the Casa Piscana (Fig. 335), overlapping floors create areas of shelter from the sun mixed with open sky courtyards. The bridging volumes overhead make the space seem private and secure, while the wall less rooms of the different levels open up to these different spaces creating a seamless connection between indoors and out. Tropical gardens and water features become the focal point for overlooking rooms and spaces. Living room furnishing are facing towards these spaces, and in urban settings, these spaces are within the project boundaries, creating private oasis and personal views of nature. This play in geometry and spatial organization, as well as materiality and landscaping, are all inspirations for this design. Both architects accomplish similar goals in similar orders to this project's design.

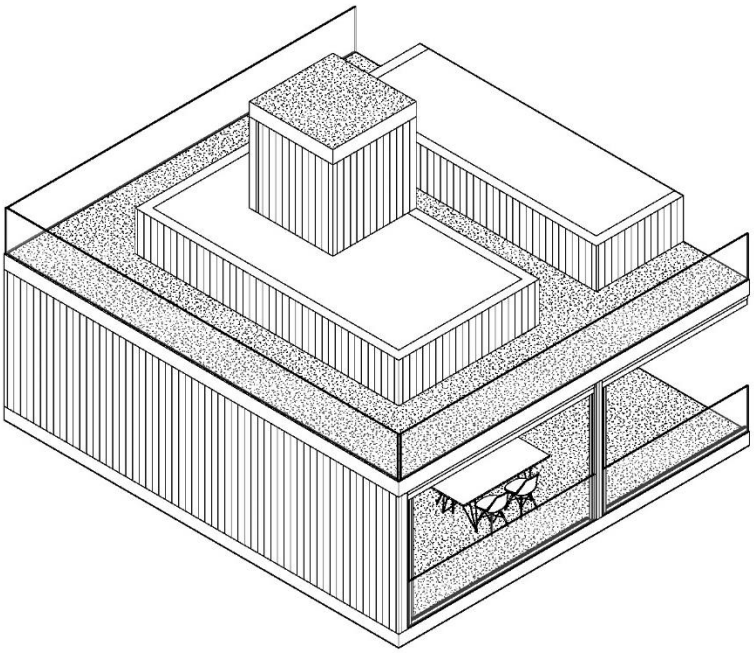
Another architect of inspiration for this project comes from Vietnam, Vo Trong Nghia. His Binh Than House is a great example of integrating environmental living into a dense urban setting (Fig. 336). He too uses concrete shelves to create clear spanning living spaces but stagers each volume as the building rises to give spaces for gardens and privacy walls. His entry garden pushes the first two floors of the house to the back of the property so trees and vegetation have space to grow vertically. This move is done again on the third floor where a roof garden pushes back the volume above it to receive daylighting. This push and pull of building elements to give room to natural elements makes the priority of the design on the landscape more so than the architecture. But his architecture still represents Tropical Modernism gracefully with its concrete artful breeze block and vocabulary.

Fig. 336. Nghia, *Binh Thanh House*. 2013, Vietnam.

Roofs

Concrete Flat, Cast-in-Place

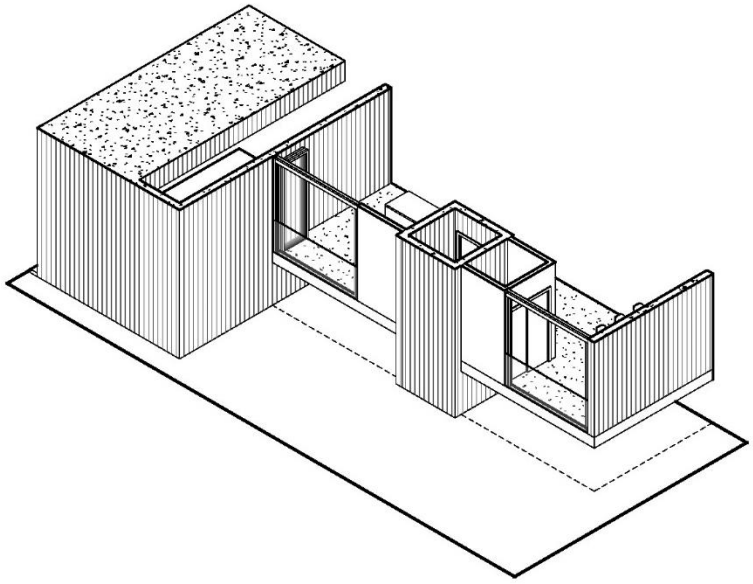
The open shelf idea of the units means that each space is essentially a rectangular extrusion. The floor of one unit becomes the overhang on the room below and the roof above becomes a public space for the units above. The roofs are flat to increase the useable floors space and some have gardens on top, while others are just for gathering. The long spans and cantilevers are achieved with the cast-in-place concrete construction technique.



Structure

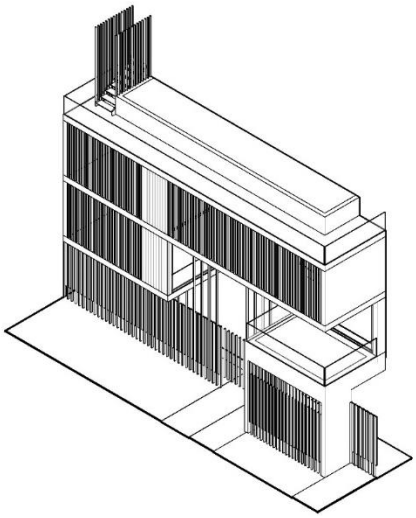
Board Formed Concrete

The main structure of the building is cast-in-place board formed concrete. There are minimal columns and beams as thick floor slabs span from wall to wall. The elevator cores also act as structural columns for spanning elements. Lateral bracing is achieved through the overlapping of the shelf masses in ways that they stack and brace against each other. The board formwork is orientated vertically.



Wood Framing

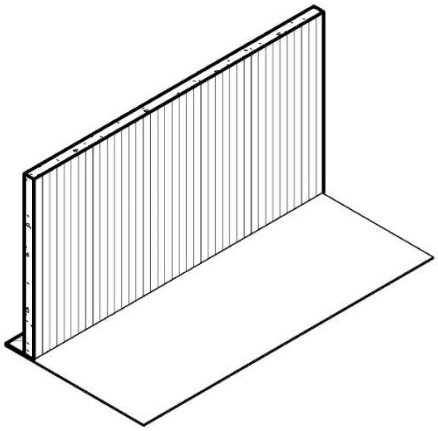
The infill between concrete structures is done with a variety of different wood framing techniques. Though they aren't structural members in most cases, they do make of walls and shading screens on the edges and interior of the design. Either typical stud framing covered in wood paneling, or a series of wood posts make up a privacy screen.



Walls

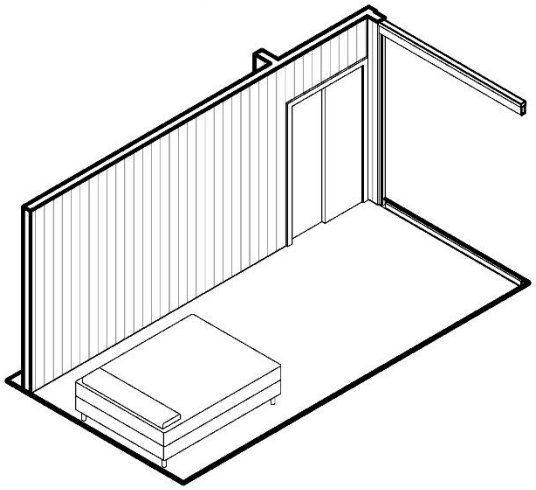
Board Formed Concrete

The unfinished concrete walls make up a defining element of both the exterior composition and interior finishes. The vertically orientated formwork puts an emphasis on the vertical line of the otherwise long spanning horizontal shelves. The impurities are intended.



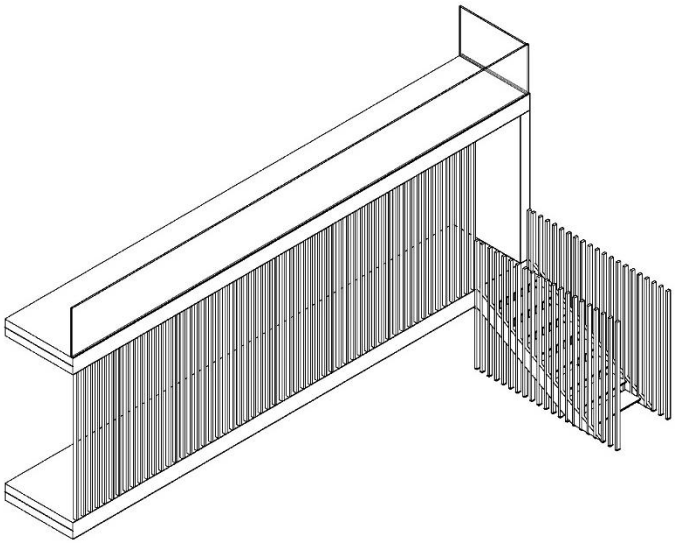
Wood Paneling

Interior walls between bedrooms, bathrooms, and living spaces are framed out and built with wood paneling as their finished material. The wood paneling in a dark natural brown brings color to the otherwise monochromatic concrete building. The two materials work well together as they represent earth and plant.



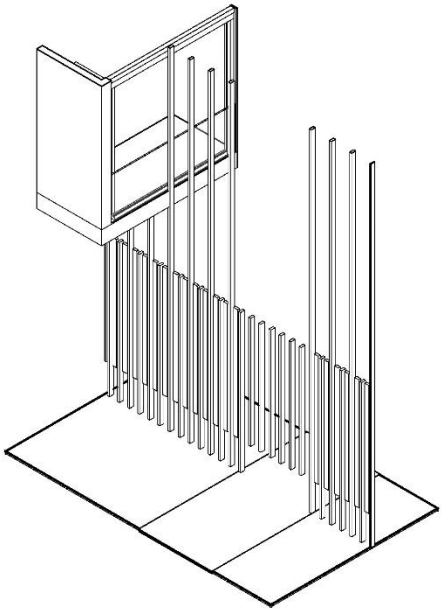
Vertical Wood Louvers

Ventilated privacy screens are created by spacing out dimensional wood members with gaps in between. They work to both shade the interior spaces as well as obstruct views from outside in. Their tight grouping create visual bars between the shelves and make an overall contribution to the language of the building. Because they are operable and spin on axis, the can be closed off or opened up for ventilation – relating back to the jalousie vernacular of the area.



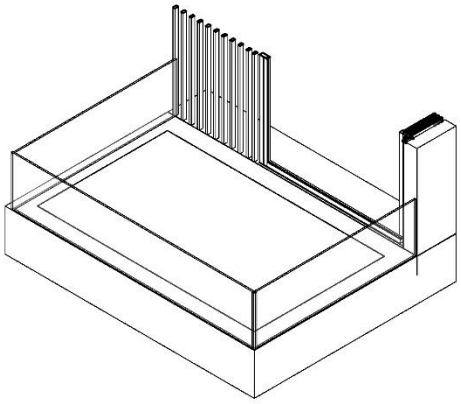
Wood Fence

At the entryway of the site a wood fence protects the community space from the street. Oppositely orientated boards of varying height create an interesting surface that is still breathable but also obstructs views inward. This wall is a more creative play on the vertical wood louvers of the rest of the building and serves as an interest point upon entering the main gate of the site. They are a play on Japanese wood fences.



Glass Railing

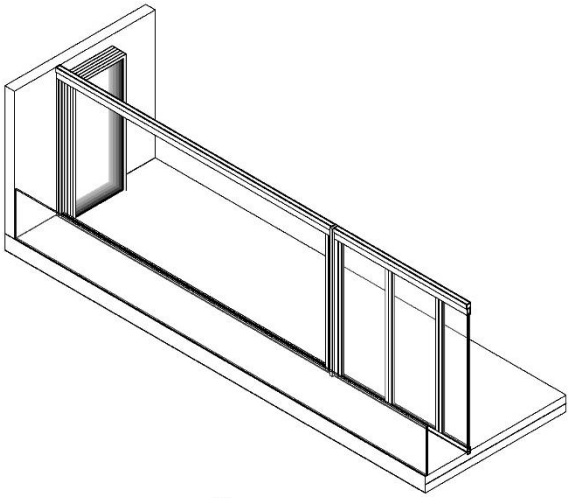
The edges of the flat roof tops and open shelves are lined with glass railings so that the purity of the concrete masses is left unobstructed. That being said for aesthetics of the building, it also leaves views unobstructed from within.



Doors

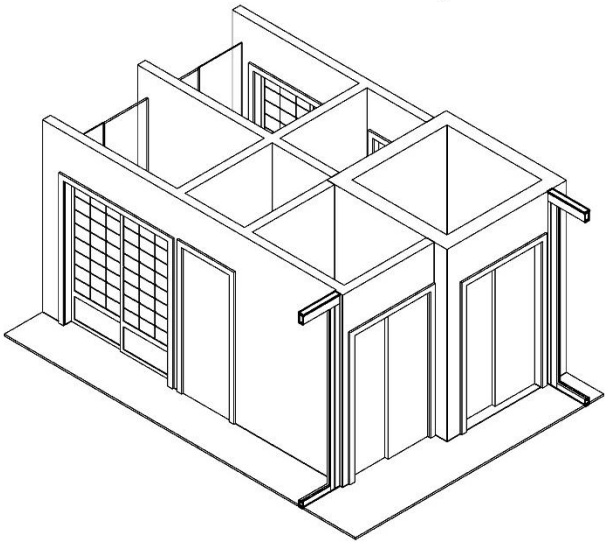
Folding Glass Doors

The large spans of concrete are intentionally left to open sides of the building up either to the courtyard or other garden spaces. They can be closed off however, in case of storms, high winds, or extra privacy through floor to ceiling folding glass doors that fold up into a fraction of the space and allow for greater accessibility.



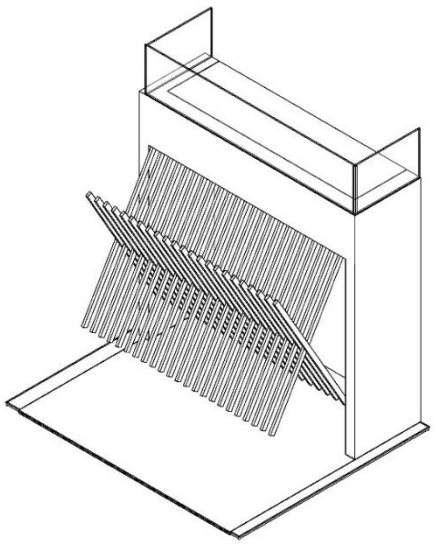
Sliding Wood Doors

Interior doors, like those between bedrooms and bathrooms, to access closet space, or elevator doors, are simple wood sliding doors, or sliding shoji panels. The two panel wood doors either blend in with the wood paneled wall or stand out nicely against the concrete walls. Sliding doors take up less floor space than swinging doors and relate to cultures of the project.



Horizontal Pivot Door

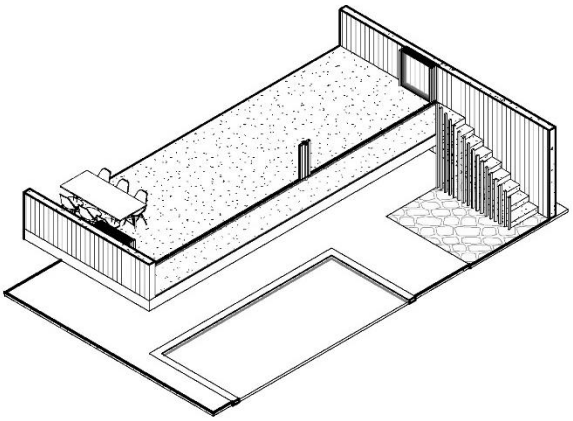
The garage entrance is through a horizontal pivot door made of alternating wood members. It can be actuated to open up by an axis in the middle, making the flat face spread open like wings. When the door is closed it appears as one of the vertical wood louvered walls. Its opening is part of the first experience when entering the property.



Floors

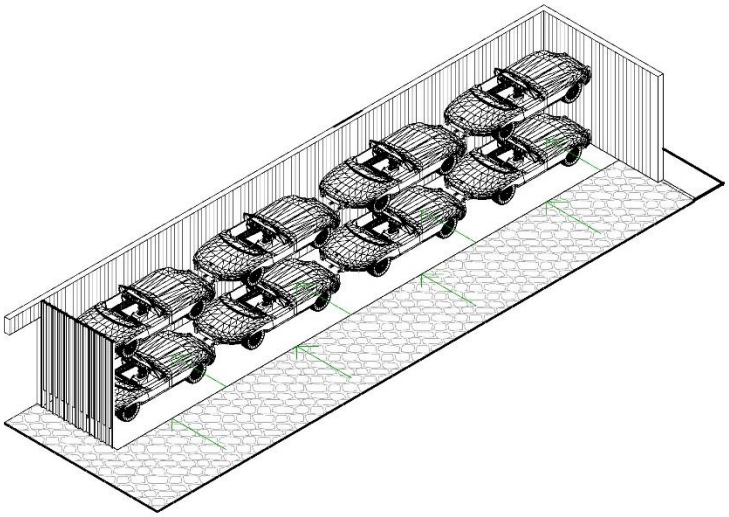
Elevated Concrete Floors

The majority of the floors are elevated and made of the same cast-in-place formwork. Even the first floor public spaces are elevated off the ground due to flood plain concerns. The elevated floors float above the ground and courtyard connecting the building like bridges.



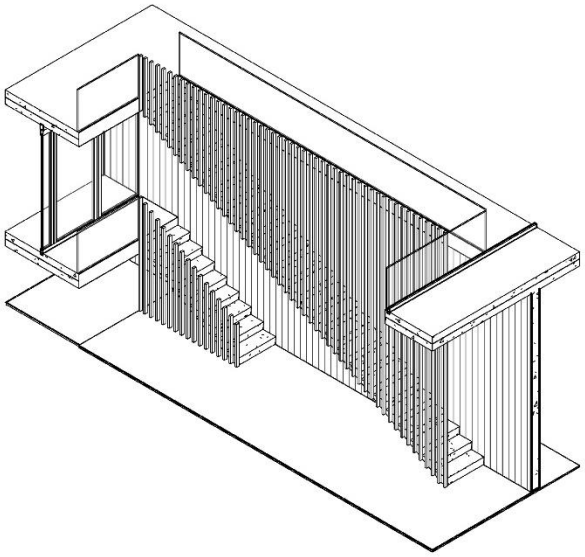
Mechanical Parking

To decrease the ground space needed to accommodate parking for the building, a side loading mechanical parking unit was used. Drivers pull up onto a moving platform, exit their car, then the parking machine slides their car off the platform onto different spaces on the rack. Cars are stacked vertically rather than horizontally.



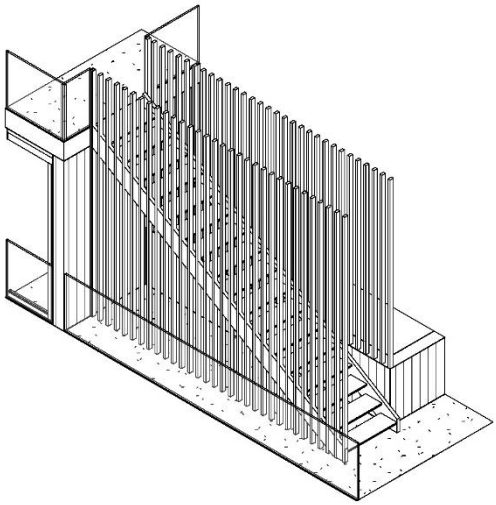
Concrete Stairs

Along the concrete walls, vertical circulation is cast in with the same formwork. Cantilevering off the wall, the stairs become a design feature rather than an afterthought. Instead of typical railings, vertical louver walls are used to keep people safe as well as connect the circulation visually with other elements of the design. They span full floor to floor to add to the vertical composition.



Wood Stairs

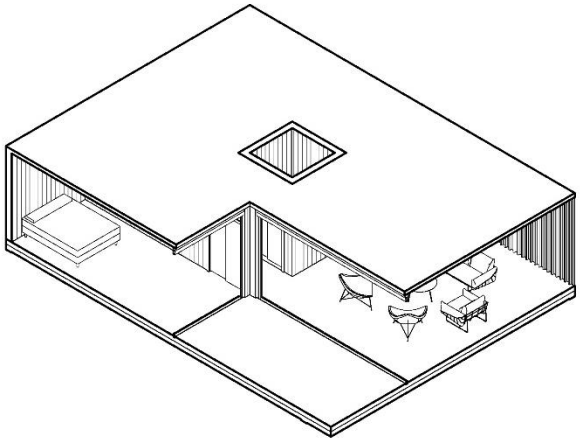
In places not against walls, wood stairs are used for vertical circulation. Done in a similar manner, they are situated between two vertical wood louver walls that span the full height from floor to floor. The wood members act both as supports and railings for the stairs. Spaces bellow can then be accessed for storage.



Outdoor Rooms

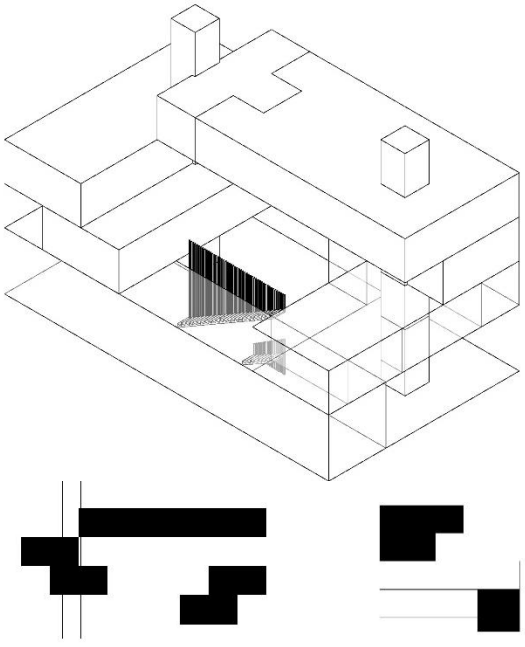
Lanai

Most of the units have their living room areas formulated like a lanai – open to the elements on at least two sides and spilling out to outdoor space. Some of the bedrooms also have a wall that can complete fold away so that bedrooms also have cool breezes and ample sunlight throughout the day.



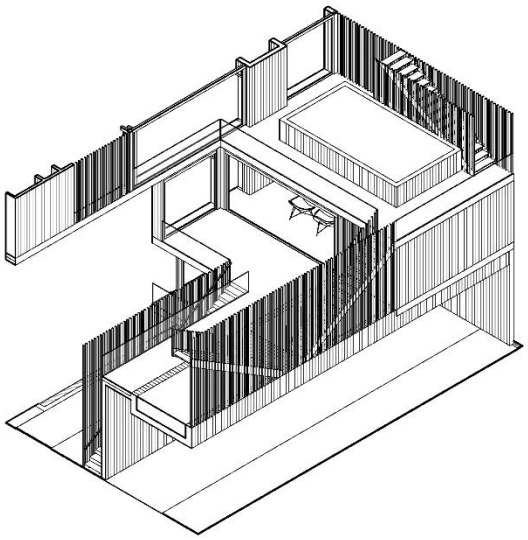
Courtyard

The courtyard isn't a straight cubic volume. Instead units overlap and spaces are pushed and pulled back, creating a three dimensional space of layered masses. This creates more varied moments rather than just one focal point. Because of the staggering, rooftop gardens get more southern exposure while living spaces get more shade. The courtyard space from the bottom is also supposed to give reference to the caves of Mō'ili'ili.



Wall-less Rooms

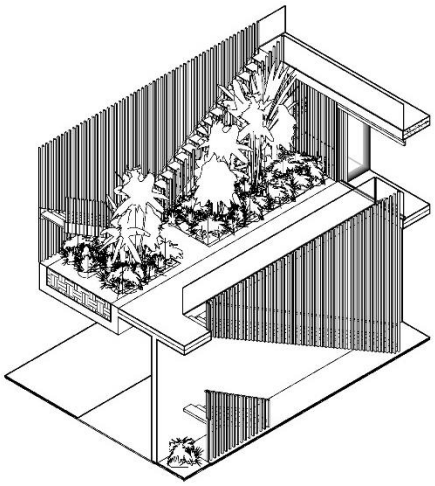
Much of the public space that extends off of the units are connected to the overall courtyard space but also make wall-less rooms of their own. These are areas without roof coverage but are defined loosely by floor lines and railings. They function primarily as circulation but also work as gathering spaces or areas for residents to bump into each other.



Nature

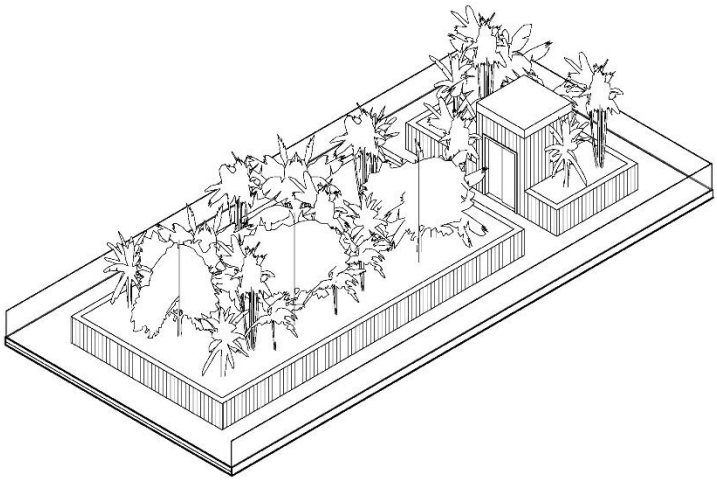
Rooftop Gardens

Above some of the spaces are rooftop gardens, set flush with the floor line, the planter that holds them is recessed into the space below. These gardens function as community plots, located in the public space between units where residents can grow their own fruits and vegetables – each maintained by those living on that floor.



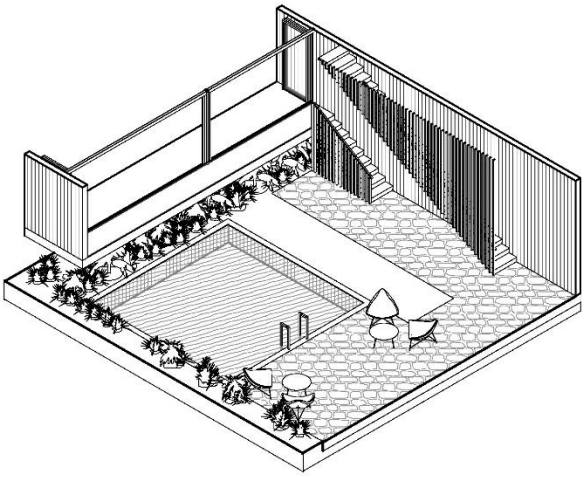
Rooftop Planters

In some areas, planters are used instead of recessing the garden into the space below. These large planters are also used for urban agriculture and aren't meant purely for decorative plants. Residents are encouraged to grow plants as it not only creates a fresh food source, but also helps mitigate the urban heat islanding.



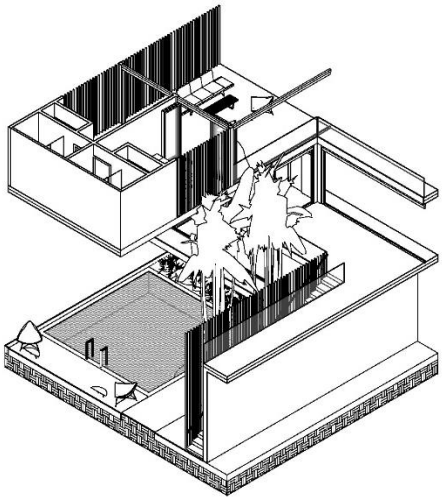
Pool

There is a pool on the first floor of the courtyard below the public amenity floor. This pool not only is an aesthetic feature for the space, it also references back to the ponds that Mōʻiliʻili was once known for. Filling the space with activity, it serves as a focal point for the courtyard and a way to cool the space during hot Kona wind days.



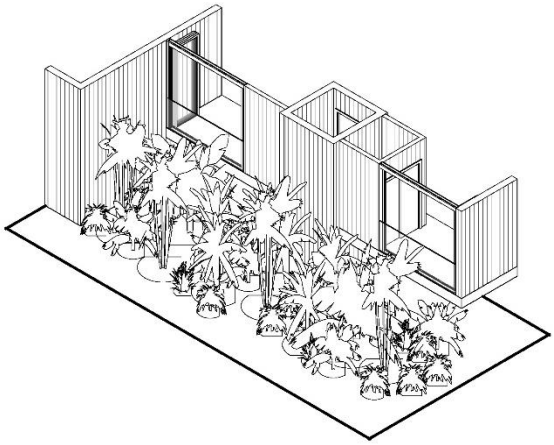
Vegetated Courtyard

The courtyard is also planted with tall palm trees that extend through the spaces between overlapping units. They help shade the courtyard from southern sun, but also the floors above are treated to views of the palms swaying in the wind just outside their lanais. The area around the pond and first floor is also planted with vegetation.



Gardens

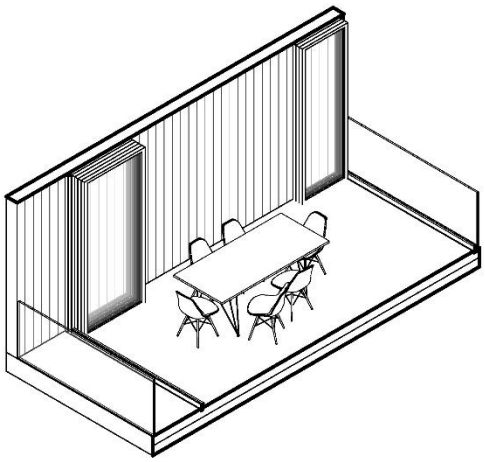
Spaces on the first floor where units or rooms look out onto them are planted with dense vegetation, creating pockets of cool air and shade as well as bringing natural scenery back to the site. They serves as focal gardens for people to look out over at on the lower levels.



Furniture

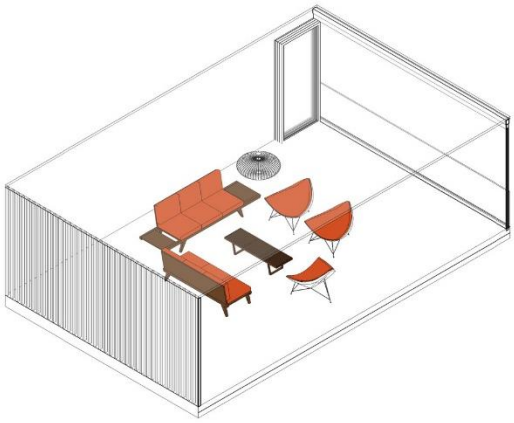
Eames

Eames furniture is used in the public areas as well as dining rooms of the units. The simple wire based fiberglass molded chairs are minimal and modern. They come in a variety of colors and finishes as well, adding spots of color and plasticity to the monochromatic rectilinear design of the building.



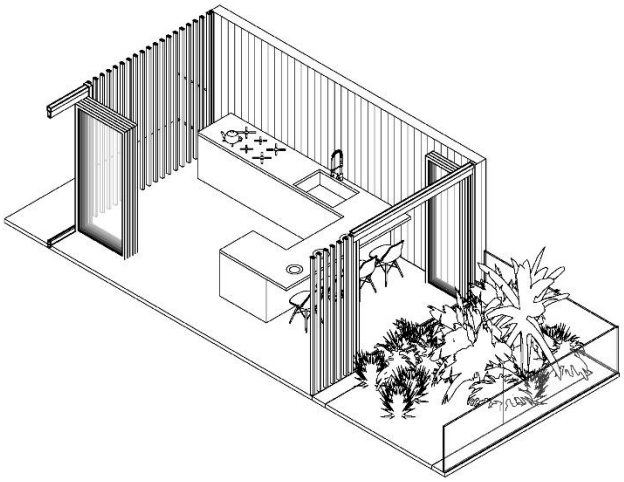
Nelson

George Nelson's Coconut Chair was chosen to liven up the living spaces with some tropical color and forms. The building is minimal and rectilinear, but covered in gardens and vegetation. The furniture does the same with composing rectilinear sofas with the organic shapes and curves of Nelson's Coconut Chair and bubble lamp.



Industrial Kitchen

Lindsay specifically requested industrial quality kitchens. Meaning stainless steel cabinets and countertops, no overhead cabinets except for racks, and large wash basins instead of small sinks. Refrigerators are under counter and out of the way. Also vegetable and herb gardens are located in close proximity to the kitchens.



Data

Floor Plans

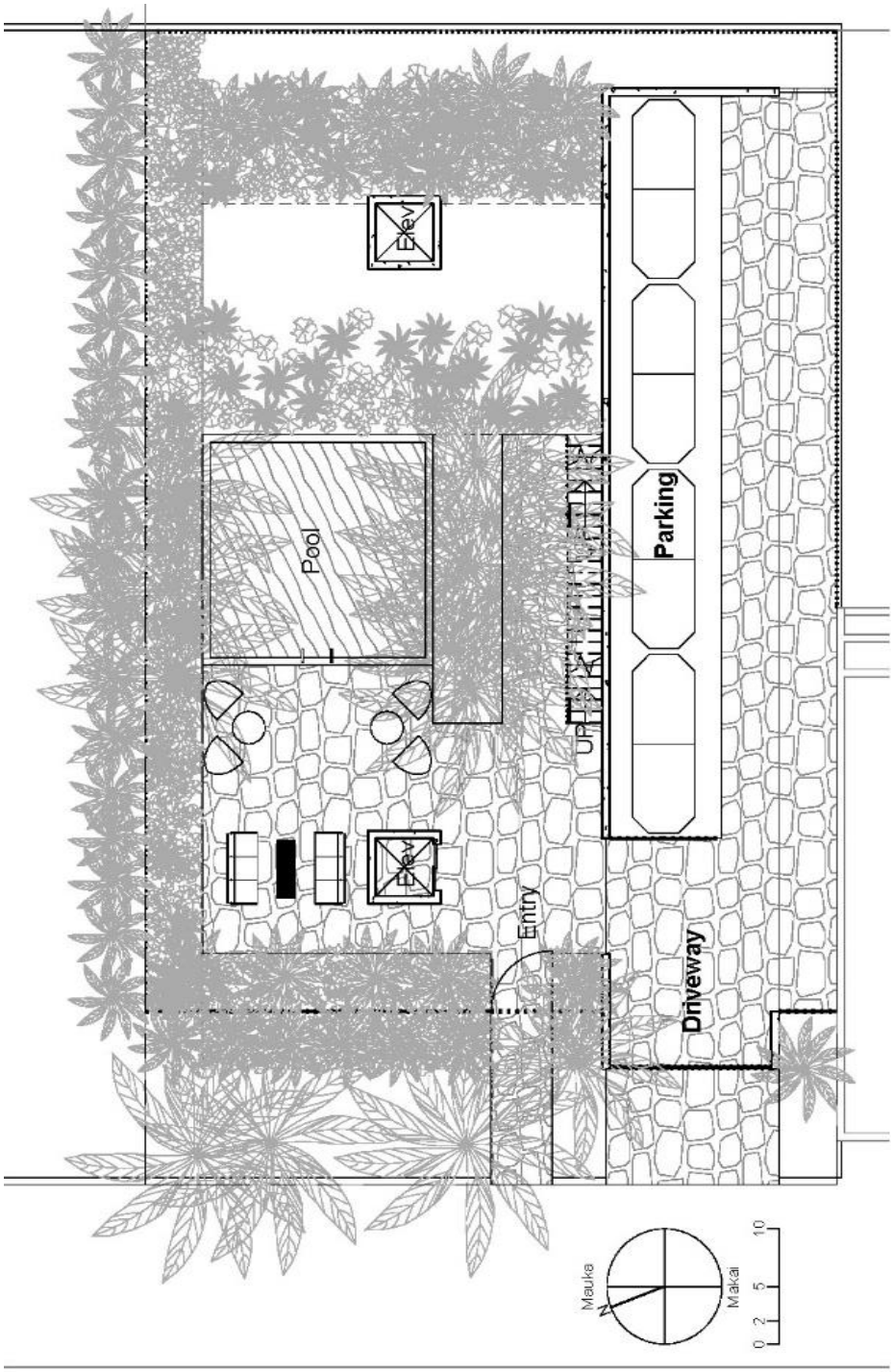


Fig. 337. Project B, *Level 1*. Scale: 1/16" = 1'-0"

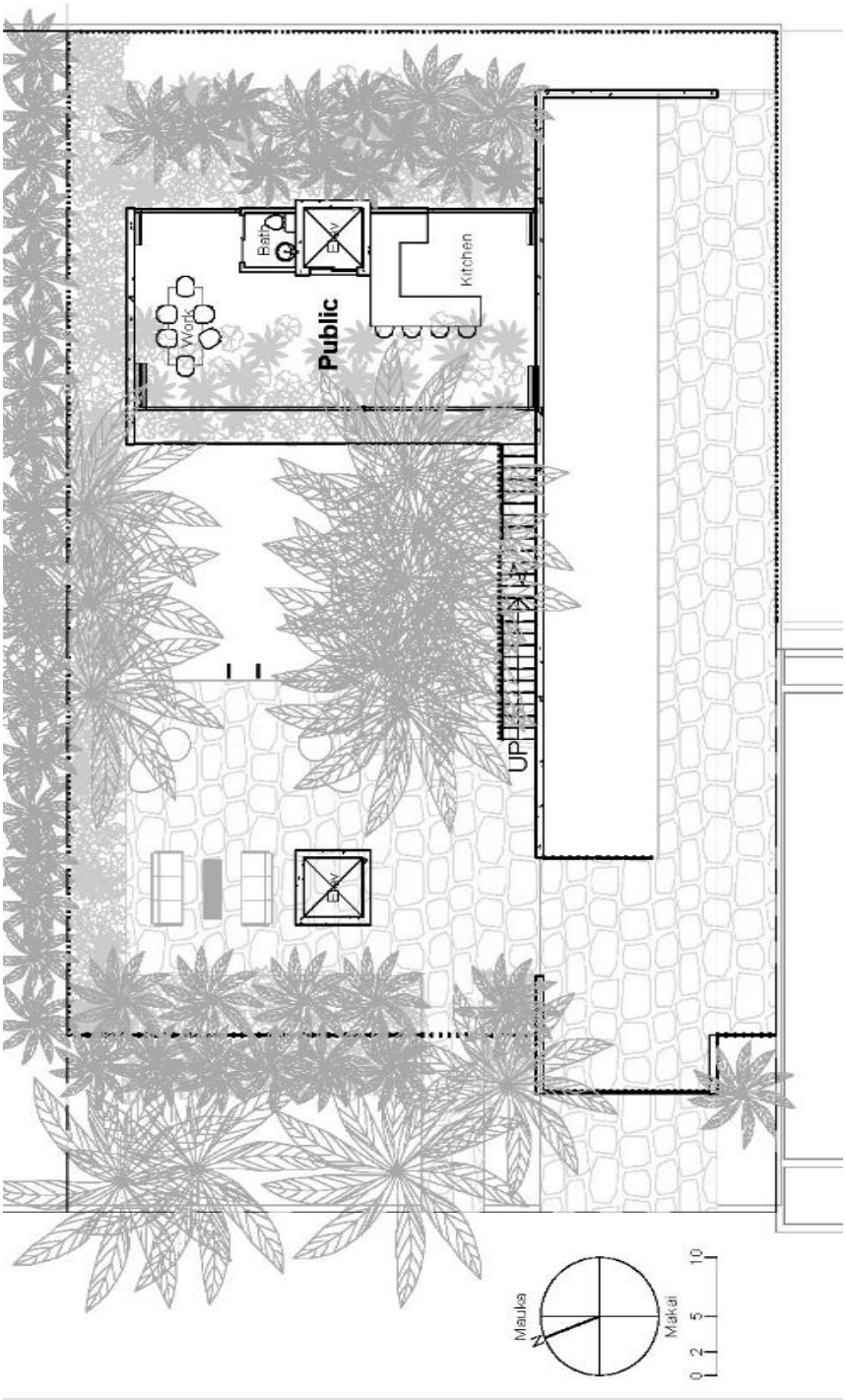


Fig. 338. Project B, *Level 1.5*. Scale: 1/16" = 1'-0"

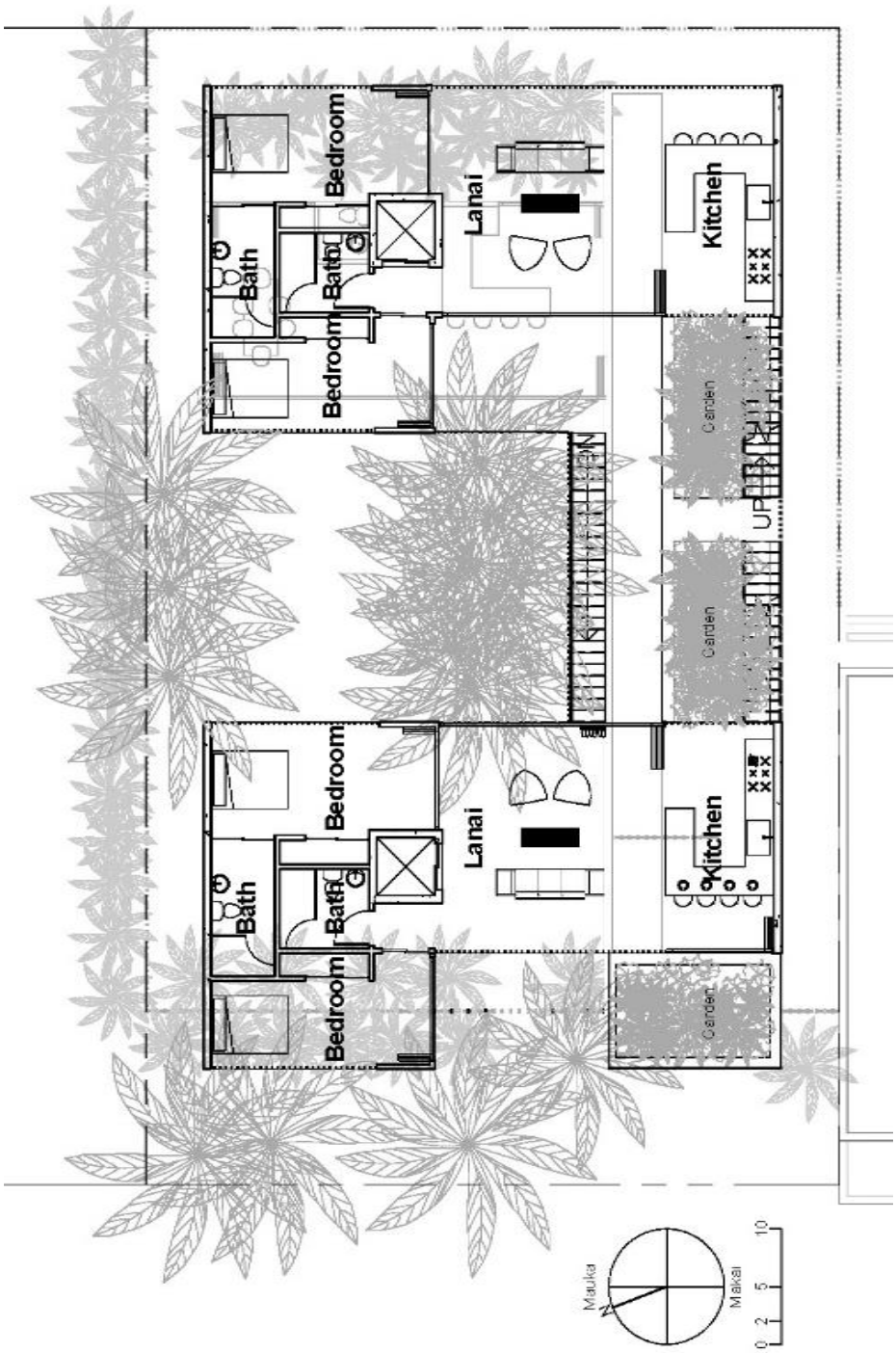


Fig. 339. Project B, *Level 2*. Scale: 1/16" = 1'0"

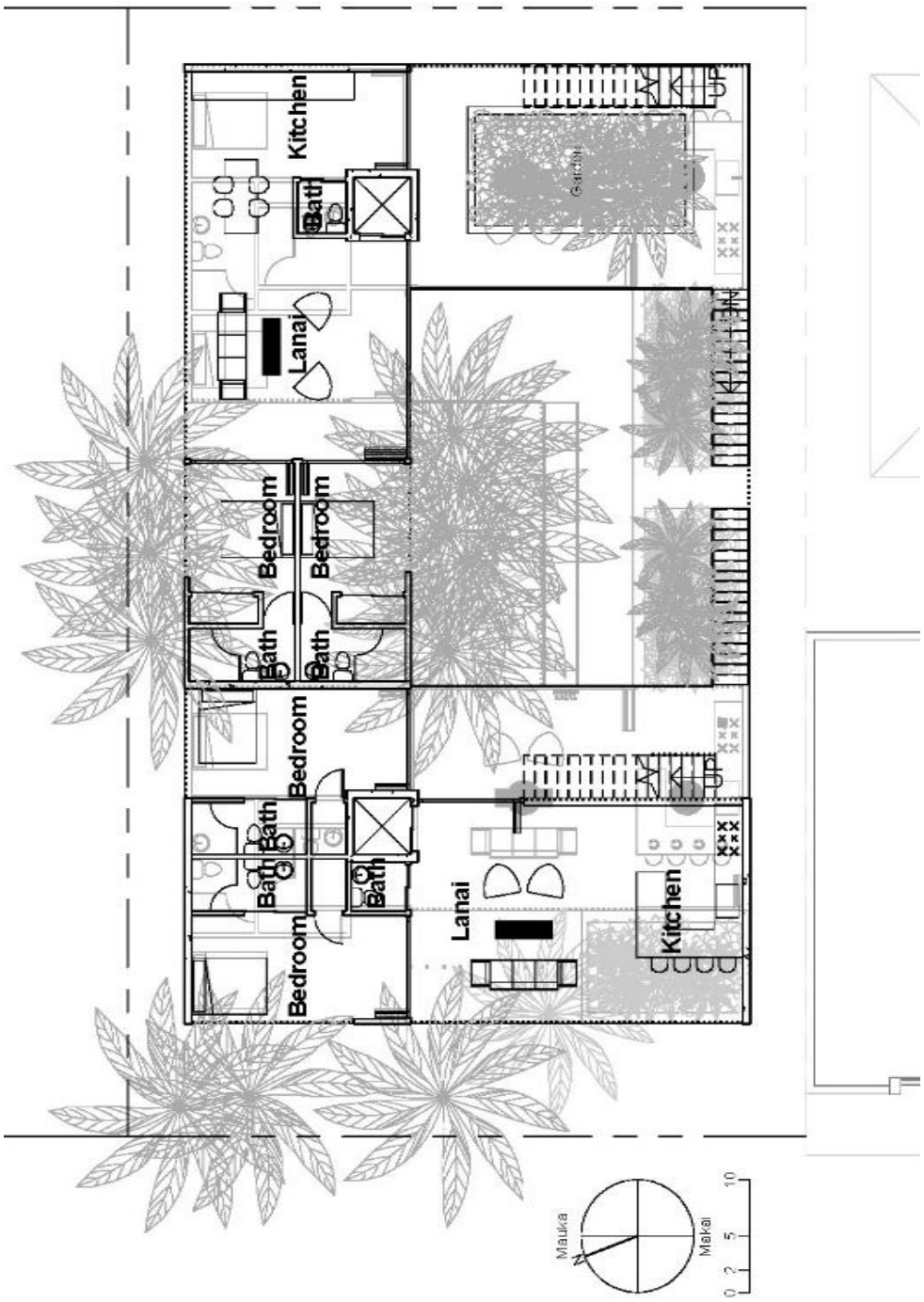


Fig. 340. Project B, *Level 3*. Scale: 1/16" = 1'0"

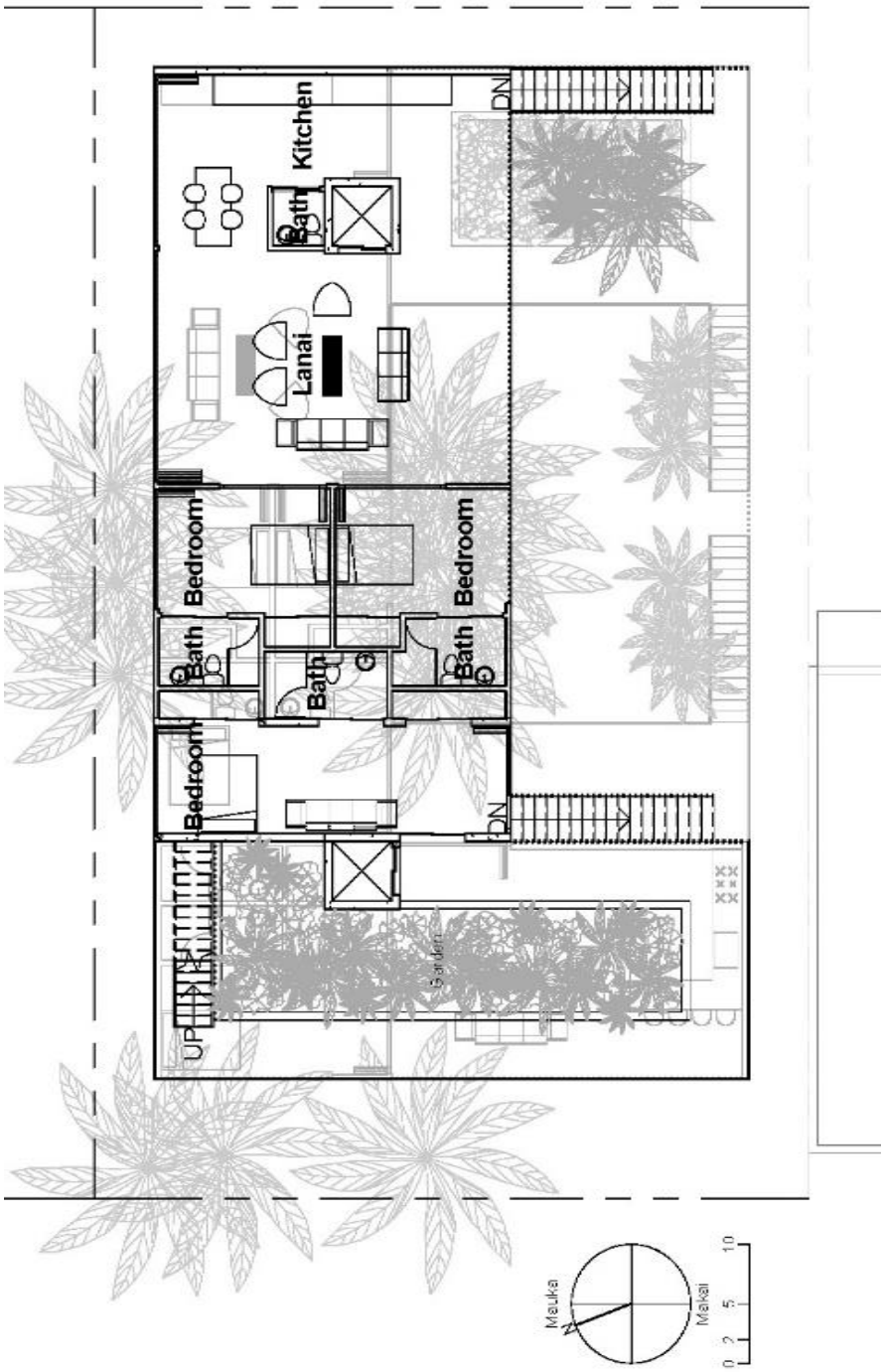


Fig. 341. Project B, *Level 4*. Scale: 1/16" = 1'0"

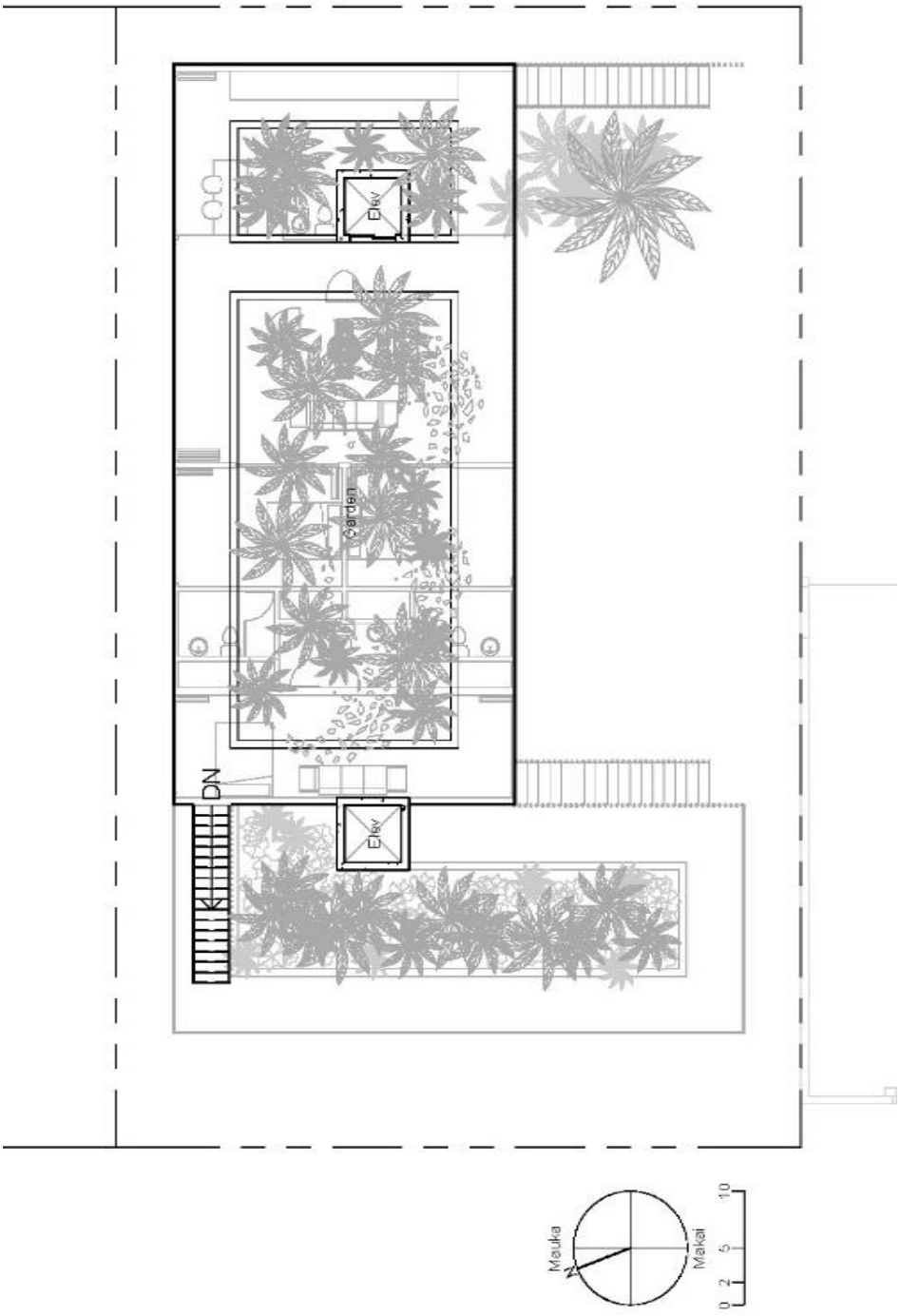


Fig. 342. Project B, *Level 5*. Scale: 1/16" = 1'0"

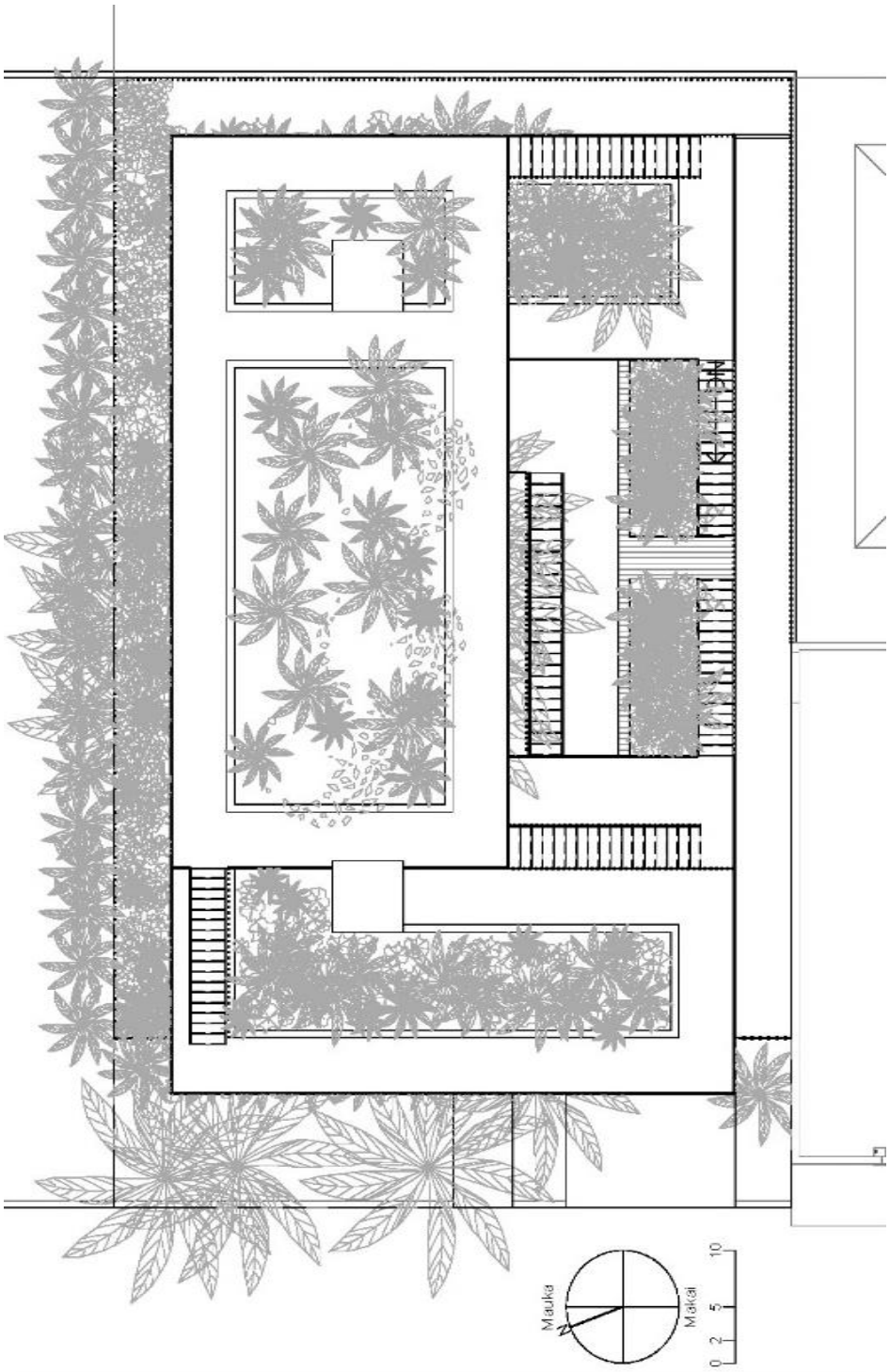


Fig. 343. Project B, *Roof Plan*. Scale: 1/16" = 1'0"

Elevations

Fig. 344. Project B, *Diamond Head Elevation*. Scale: 1/16" = 1'0"

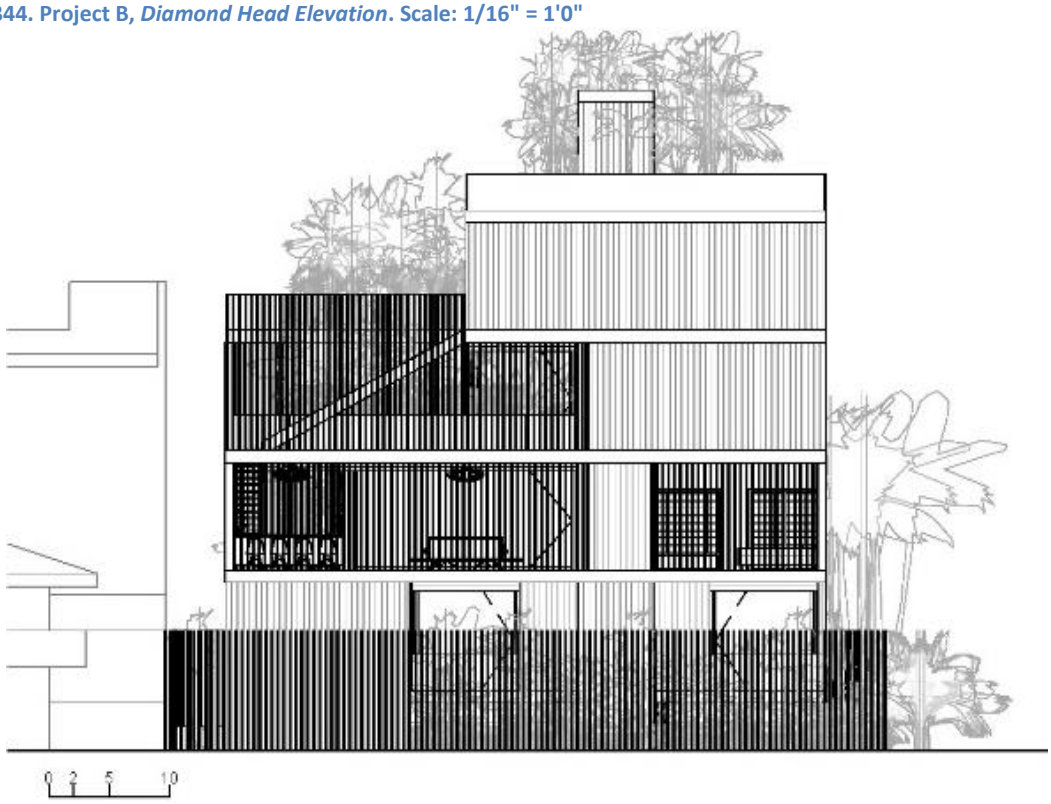


Fig. 345. Project B, *Ewa Elevation*. Scale: 1/16" = 1'0"

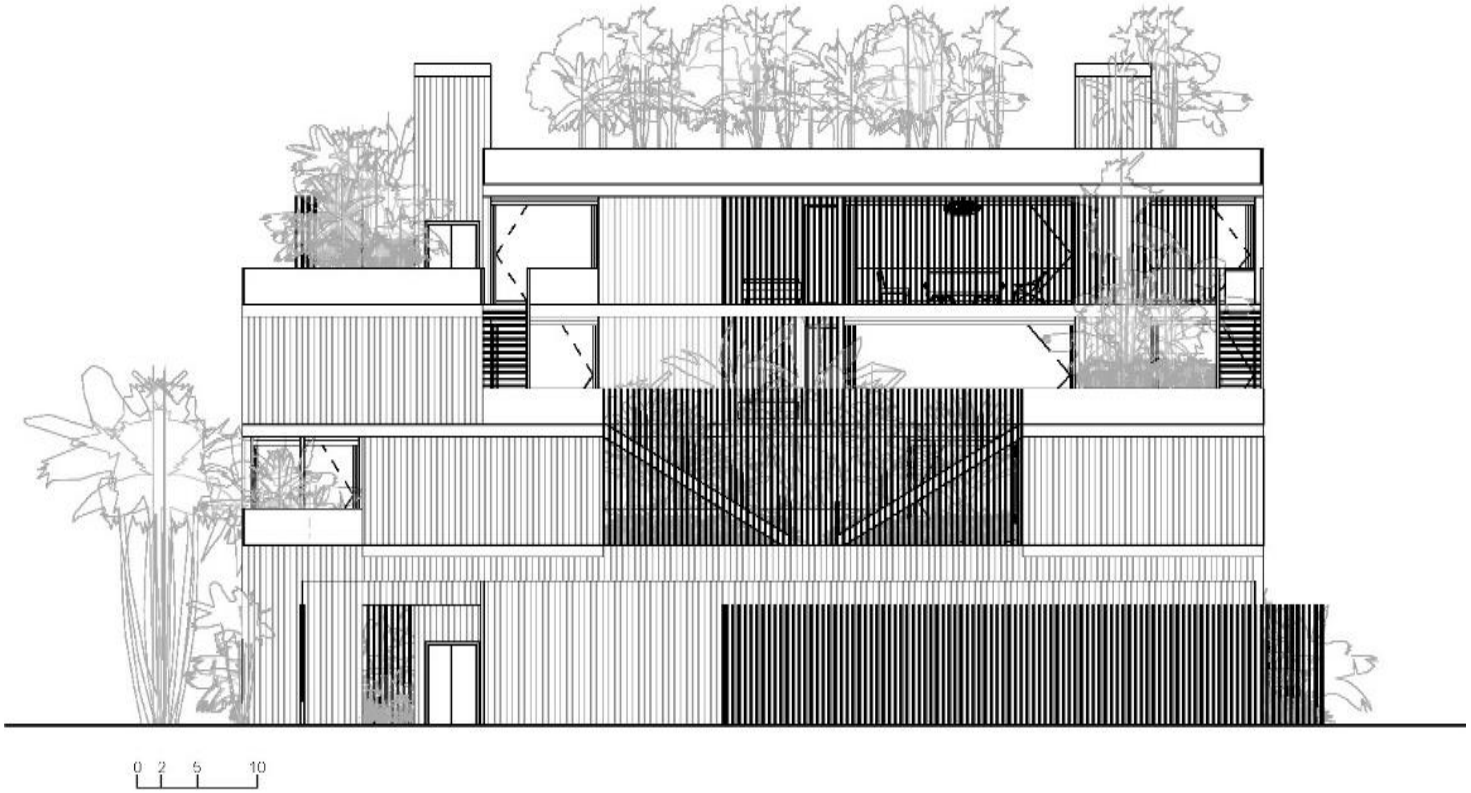


Fig. 346. Project B, *Makai Elevation*. Scale: 1/16" = 1'0"

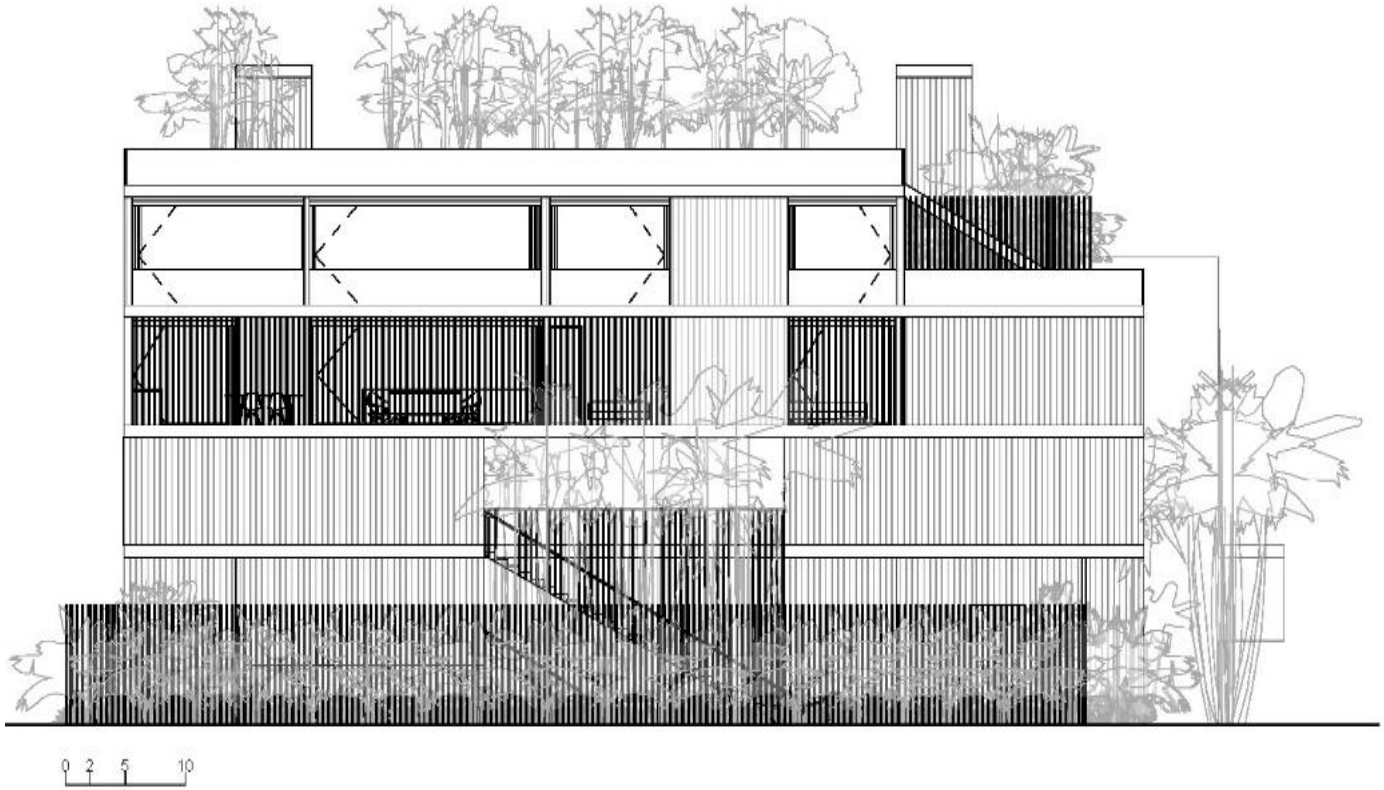


Fig. 347. Project B, *Mauka Elevation*. Scale: 1/16" = 1'0"

Sections

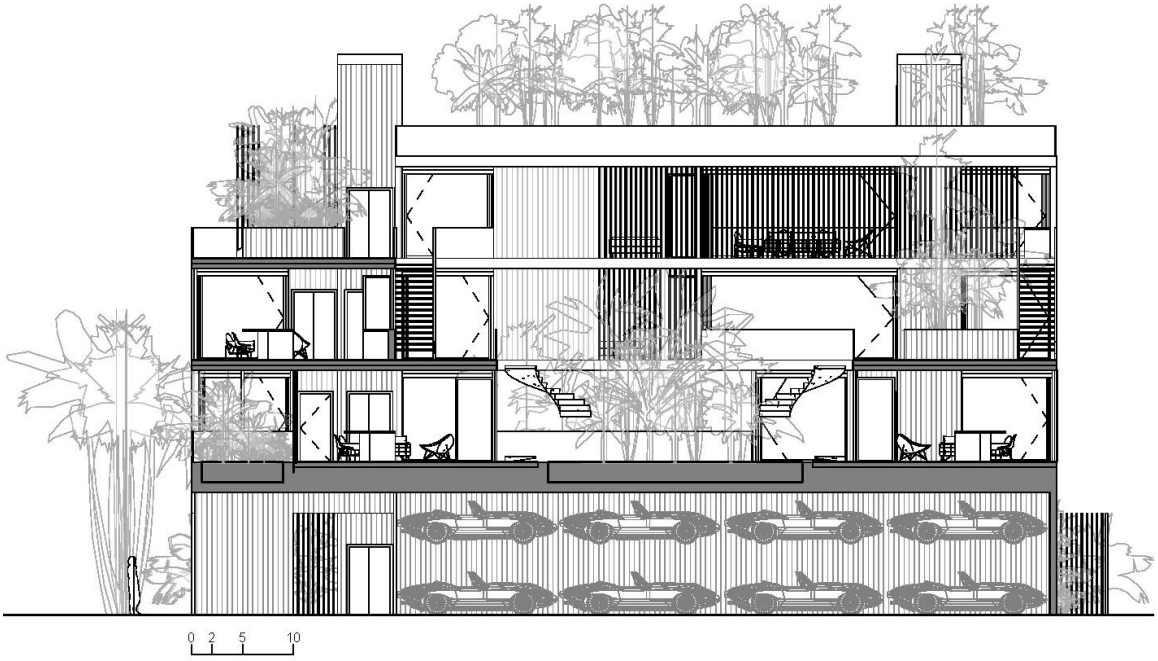


Fig. 348. Project B, *Diamond Head-Ewa Section 1*. Scale: 1/16" = 1'0"

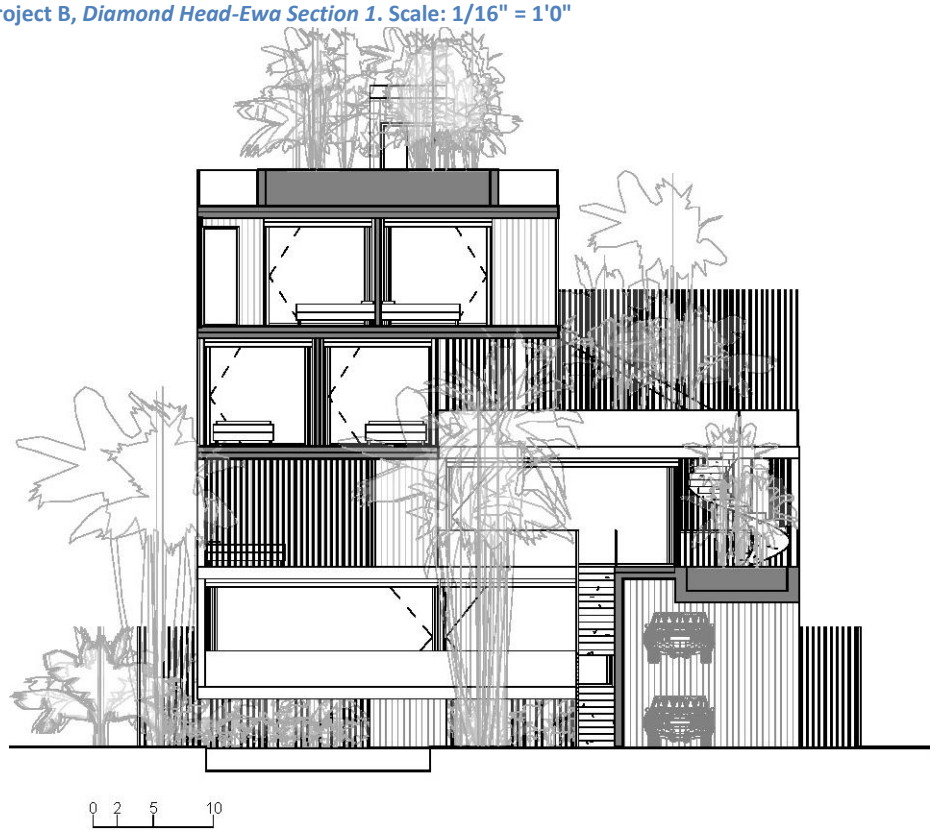


Fig. 349. Project B, *Mauka-Makai Section*. Scale: 1/16" = 1'0"

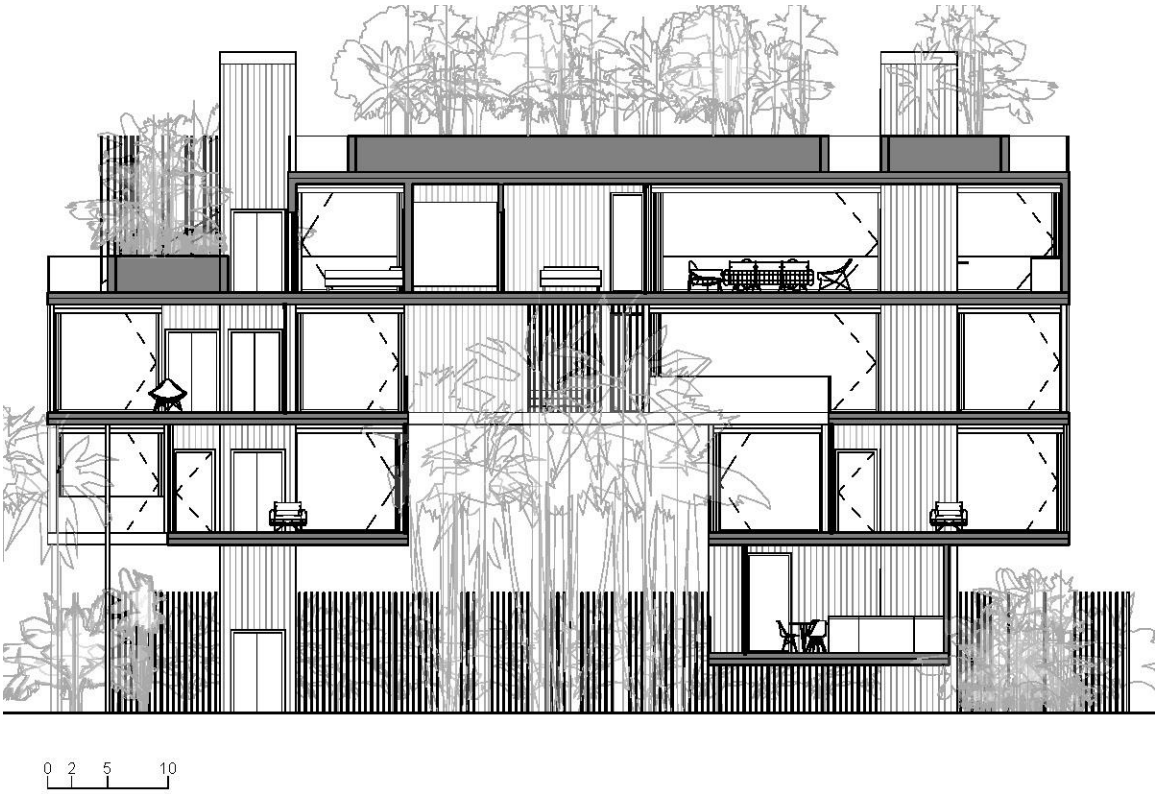


Fig. 350. Project B, *Diamond Head-Ewa Section 2*. Scale: 1/16" = 1'0"

House

Fig. 351. Project B, *View from Hau'oli Street*

Fig. 352. Project B, *Bird's eye view from Hau'oli Street*

Fig. 353. Project B, *Front View from Hau'oli Street*

Fig. 354. Project B, *View from Entrance looking through Courtyard*

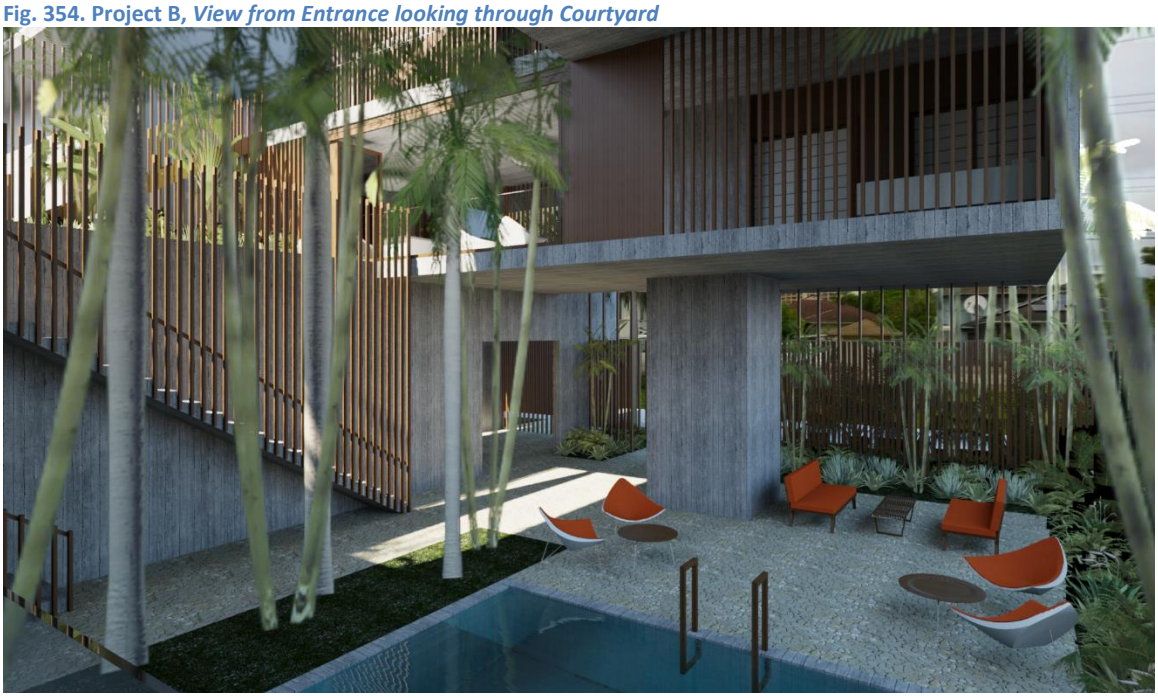


Fig. 355. Project B, *View from Public Space through Courtyard towards Entrance*

Fig. 356. Project B, *View from Third Floor Looking East*

Fig. 357. Project B, *View from Third Floor Looking North*

Fig. 358. Project B, *Interior View of Typical Unit, Lanai and Kitchen*

Fig. 359. Project B, *Interior View of Typical Unit looking through Courtyard*

Poetics of the Designs

Previously in this dissertation there was the discussion of the 'poetics of Tropical Modernism.' Discussed was the relationship between the design language of the tropics and the spoken languages of the tropics. It was analyzed that the spoken poetry of a culture has many similarities to the architecture of a culture. The Japanese haiku and the Hawaiian mele were used as examples in this comparison.

In these two design projects undertaken in this section, how do we analyze the poetics of their design? Both projects are multi-cultural in their origins, depicted by site and client, so there is no one example of verbal poetry that an analysis could be made with. However, the idea of poetry as the art form of a language is what was trying to be represented in the designs. Language, both verbal and design, is used to communicate and convey messages. One must know how to speak and understand the language in order for these messages to be conveyed. Once someone has a good handle on the language, they can start to use it to create art – poetry. This dissertation was done to understand and get a handle on how to speak and communicate with the Tropical Modern design language. Once that understanding was made, it was then about using it to create art or poetry.

The two designs were intended to not only convey messages about the site and the client, but were meant to do so artfully, creatively, and poetically. Poetry isn't always meant to be overt and clear, it is often hidden in deeper meaning and colorful language. But in the end, there is a message, some thought is conveyed through it, and it is comprehendible. In face it is more than comprehendible, it leaves listeners or readers with not only a message, but an emotion as well. Perhaps then to see if the designs were indeed representations of poetry, we need to see if it leaves users or views with an emotion. Because the projects aren't built, we won't know the full effect on users, but we can break down the messages and see if they at the very least spoke the Tropical Modern design language.

Both designs conveyed very complex attributes and messages based off factors of both site and client. Through their ordering they expressed ideas of program, climate, cultural background, context, and setting. They reflected both the histories of their sites and their clients. Gestures were made to respond and articulate the microclimate of their neighborhood. Materials were used to that not only responded to context, but also resonated with architectural traditions. A long list of elements were used for the vocabulary of their designs – words that had symbolism and analogies to different cultures. On a macro scale they represented the place and the site. On a micro scale they represented client and their lifestyle.

One design represents a Hawai'i artist living in Mānoa. The other represents a young couple and their family living in the urban area of Mō'ili'ili. But both designs tell a more complex story than that. And perhaps that is the poetry in their lines. At face value they are both simple structures, represented in several pages of data. But their meanings, their messages, and their vocabularies tell a longer story spanning generations. Generations before either client was even born, or before their families immigrated to Hawai'i. The poem also tells of the present, their lifestyles, their needs, their habits, how they use their homes, and how the live their lives. The design poems tell of another story too – and though they are not going to be built – each design tells of how they intend to be used. They tell of how the Mānoa rains and winds will fall on the roofs and blow through the house. They tell of how the Mō'ili'ili neighborhood will once again return to a tropical oasis and feed its families. The designs might represent simple goals, but their

poetry is about a complexity. It is about past, present, and future. It is about nature and man, and how they must coexist in the tropics.

One design is about sculpting views. The poem of the Mānoa project is about sculpting the stories that lie in the mountains, sculpting the rocks that lie in the gardens, sculpting the winds and the rains that sweep through the valley, sculpting the cultures of the client, and sculpting the day to day life of an artist.

The other design is about creating space. The poem of the Mō‘ili‘ili project is about creating spaces for families to stay together, creating spaces to call your own in a dense city, creating spaces to connect with nature in an urban environment, creating spaces to play and entertain, creating spaces for a community, and creating space to retreat.

Those are the poems of the two designs – simple actions with deeper meanings. The way that they convey this is through a language that can only be spoken in the tropics. One that is based on nature and the fine balance between man and the environment. One that looks to all factors involved with a project and makes informed decisions based on tried and true vocabularies. One that has a long history spanning seven decades of precedents. A language that is spoken in a geographic area that covers a third of the globe. A large and extensive language that can be used to create very unique personal conversations. Tropical Modern residential architecture doesn’t just mean the finite areas that lie within the tropical latitudes; it doesn’t just mean the architecture that came from the modern idiom; and it doesn’t just refer to single family suburban homes. It is a large an encompassing language, but a language that is so specific at the same time.

The designs here are examples of this language and are meant to be seen as poetry. The precedent architects and their projects that were researched are examples of this language and are also examples of its poetry. The analysis of the language, from vocabulary, to syntax, to spoken sentences, is an attempt in perpetuating this language and hope that more conversations will come.

Conclusion

This dissertation is the accumulation of research, analysis, study, representation, and creation of the Tropical Modern residential design language. It went over the history and origins of the typology. From the birth of modern architecture through its immigration and migration to the tropical regions of the world. The research went over the factors that started to shape and change the modern idiom. Factors of the region, like climate, culture, setting, and environmental living. Then the research looked through five specific masters of this design language and how their designs and lives contributed to the body of work represented by this language.

Research looked at the islands of Hawai'i and the architect Vladimir Ossipoff who brought his multi-cultural sensibilities to the design language. In Florida, Paul Rudolph brought order and syntax to the language. Richard Neutra of California brought materiality and nature to the vocabulary. Brazil and Oscar Niemeyer brought flavor and life to the expression of the language. And Glenn Murcutt brought the climate into the forefront of the conversations held in the language.

The idea of a design language was then tested. What does it mean to have a common language and methodology across designs spread so far apart around the world? Where did it come from, how does one speak it, and what does it consist of? The language has vocabulary, words and elements that have specific meanings and manifestations. The language has syntax and order depending on the messages conveyed. The order of each sentence depends on what aspect of the site and client the architect is trying to convey. When all is put together – message, vocabulary, syntax, meaning, and sentences – one can speak the language. If someone can speak a language they can use it to create poetry.

Two poems were then made – representations of the Tropical Modern design language – both conveying different stories of their sites and their clients. These designs were made to prove that the language can be perpetuated and newly manifested.

In the end, an understanding and documentation of the Tropical Modern residential design language was gained as well as an extensive knowledge on the historical precedents. A catalog of the vocabulary was tabled, and a guide for creating new works with this sensibility was recorded. This language is about the relationship between nature and man, where nature is the subject. This language is about the sensibility to the setting, climate, context and history of a site. This language is about the people who are involved in the design, be they the clients as well as the architects themselves. But in the end it is about creating an architecture that is considerate of all factors of place and region, and an architecture that choses to communicate the poetics of place.

APENDIX: Syntax of Architecture Design in Hawaiian Culture

Practicum Research

For my practicum research, I needed to understand Hawai'i as a place. This was because the final outcome of this dissertation was not only an extracted design language of Tropical Modernism in residential design, but also two design examples of this research. The two designs were tests representing the methodology explained in the research. Both of these designs were in Hawai'i and on the island of O'ahu, and because Tropical Modernism is place-based modernism, I needed to research the place.

Researching Hawai'i as a place relates to the fact that indigenous Hawaiian culture and spirituality is a place based culture – the culture is tied to the place. You cannot have Hawaiian spirituality outside of Hawai'i. It is tied to the mountains, the lands, waters, plants, climate, and the cosmos surrounding Hawai'i. Hawaiian language is part of the Austronesian language type, and one commonality throughout Austronesian languages is the importance of place and task. In other languages, the subject of the sentence is the person, the task or place is the modifier. In Austronesian languages, like Hawaiian, the place or task is the subject, the person doesn't need to be mentioned and if anything are the modifier. Hawaiian culture then puts a focus on the place, it stems out of its surroundings and is a way to express and explain the environment of Hawai'i.

Tropical Modernism is 'place-based modernism,' and Hawaiian culture is a 'place-based culture.' In order to understand how to design Tropical Modernism in Hawai'i, one needs to understand aspects of Hawaiian culture. One needs to connect to the place of Hawai'i. From its mountains, to oceans, to seasons, to types of rain and wind, types of plants, types of rocks, and to its architecture. One needs to make the connection between place and architecture. Luckily, there was someone that used to already do that in Hawaiian culture, the *Kuhikuhipu'uone*.

Kuhikuhipu'uone

The Kuhikuhipu'uone is commonly referred to in English as the Hawaiian architect. But according to the actual definition, the Kuhikuhipu'uone is a "Seer, soothsayer, necromancer, especially a class of priests who advised concerning building and locating of temples, homes, fish ponds, hence a professional architect. Lit., point out the sand dunes."[217] In essence then, the Kuhikuhipu'uone was an elder (or a *kahuna*), or high priest that was a combination of architect and geomancer. Someone that connected architecture to the spirituality of Hawaiian culture – a place based spirituality. Therefore, they were someone that connected architecture to place – part architect, and part geomancer.

Part architect:

The architecture side of the Kuhikuhipu'uone was quite practical and dealt with the planning and construction of Hawaiian architecture. Their main task was for choosing the site and laying out Hawaiian temples called *heiau*, but they were also called upon to layout and observe the building of Hawaiian houses called *hale.* Their planning and overseeing process was based on ritual and spirituality but in essence was based on practicality. Hawaiian architecture was built

[217] Mary Kawena Pukui and Samuel H. Elbert, *Hawaiian Dictionary* (Honolulu: University of Hawai'i Press, 1964).

with minimal resources and each act of construction was seen as creating something from the earth. Their architectural knowledge allowed them to create climatically responsive shelters for their occupants, and was needed to show people how to construct safe structures that wouldn't fall down or break. There was no written word or documentation, Hawaiian language was an oral language only – passing on knowledge was done so in song, chant, and ritual – fixed structures of their culture. The Kuhikuhipu'uone was the keeper of knowledge for much of the Hawaiian architecture and they would instruct how to build. As the literal translation of Kuhikuhipu'uone was "point out the sand dunes," broken down it means to teach with sand. Kuhikuhi means to teach, show, or display, and pu'uone refers to the mounds of sand that they used as markers. They would literally draw out explanations in the sand to show how to build.

Structure of the hale

One thing that the Kuhikuhipu'uone had to know about in regards to their architecture, was the structure of the hale. The hale varied in size based on its function and who was to be the potential user. Because the hale is a one room shelter, there were different hale for different programs. Some were for storage, others for sleeping, and others were designed to be much larger for high chiefs to be indoors all day and night.

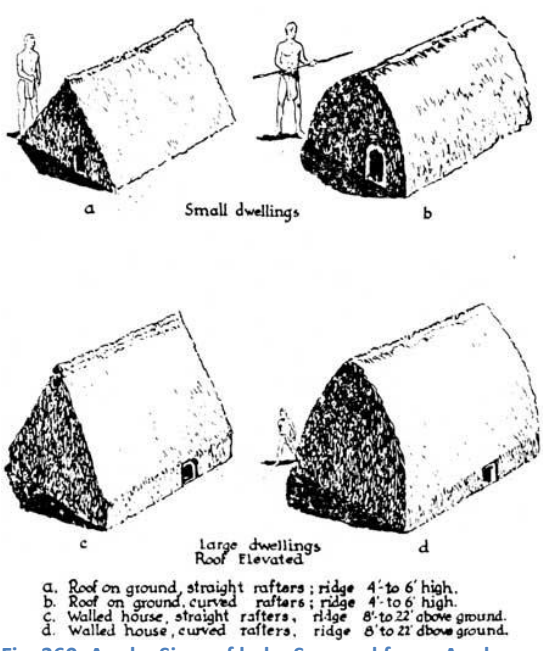


Fig. 360. Apple, Sizes of hale. Scanned from: Apple, *The Hawaiian Thatched House*, 1974, 18.

Pictured left (Fig. 360) are examples of the different hale types and their relative sizes compared to scale figures. Some were no larger than the size for one person to crawl into and sleep protected from the rain. Others had larger walls and wider bases which allowed for greater ceiling heights. The basic shape of the hale was an A-frame roof or a gabled roof hut. Depending on the construction, the rafters were either curved or straight, and the only opening was a single small door at the base which people had to crawl through. From the outside, the Hawaiian thatched hale looked like a nicely trimmed haystack. Many westerns who first visited the islands noted that because of the pili grass thatching on the exterior roof and walls, that they did appear to look like haystacks.

The actual structure of the hale, however, was very skeletal in its post-and-beam stick-framing construction (Fig. 361). Each of the structural members were lashed together with Hawaiian lashings and joinery. The house structure sat on top of a rock platform of dry masonry to emphasize its hierarchy. The Kuhikuhipu'uone was knowledgeable in not only layout design of a hale, but knew what size structural members to use, what were the proper joining techniques, and in which order the hale was assembled. Each piece of the hale had a specific name in Hawaiian, beyond post and beam (Fig. 362). Each name had a meaning that had another reference to either a deity or some aspect of Hawaiian spirituality and culture. These names

were not just for cultural reasons, but also made it easier to remember how that piece was constructed.

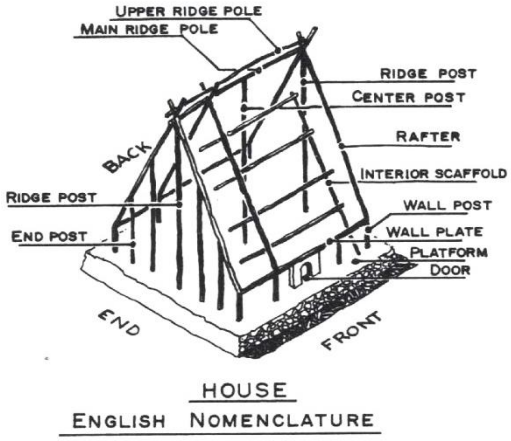


Fig. 361. Apple, *House Structure.* Scanned from: Apple, *The Hawaiian Thatched House*, 1974, frontispiece.

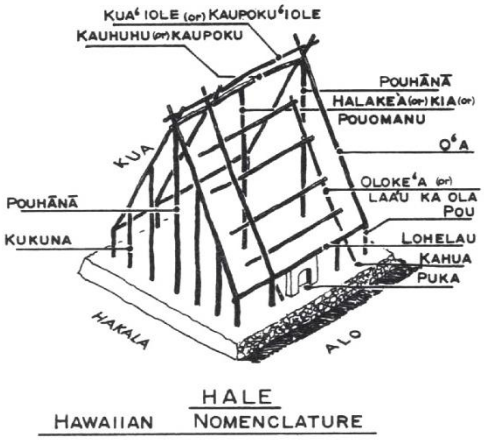


Fig. 362. Apple, *Hale Structure*. Scanned from: Apple, *The Hawaiian Thatched House*, 1974, frontispiece.

Types of wood

Another piece of knowledge that was attached to spirituality and hale construction was the choosing of the appropriate types of wood. It was said that only one type of wood should be used for one structural system in order to bring good luck. If the main post of the hale was ʻōhia, the entire primary structure of the hale needed to be ʻōhia. This was a superstition attached to reason, for if there is some consistency in the wood members the structure would be easier to build, be built straighter, and the coefficient of expansion of the material would be mitigated. As Russell Apple, the writer of "The Hawaiian Thatched House" explains,

> All rafters were also to be made of one kind of wood. Apparently, the entire frame could be of one kind of wood without offending the gods, but if more than one wood was used, all house posts should be of one kind, and all rafters could be of a different kind of wood. It is not clear what wood the thatch network should match, if any, or if it could be made of a different wood entirely.[218]

For a chief's house, wood was chosen with perfection in mind. Straight, long pieces were chosen with little imperfections, bumps or holes in them. This not only made them stronger, structurally, but also made them more aesthetically pleasing. Hawaiians had a measuring system that was based on the human body. Dimensions were given in lengths between tips of the fingers with arms extended, or in the approximation of diameters of limbs. For example, a post for smaller hale might be about the size of a calf, while a larger structure would need a post the size of a thigh. The Hawaiian hale builder then would need to have an understanding of structures and how to carry loads through a building, and the sizing of structural members.

[218] Russell A. Apple, *The Hawaiian Thatched House* (San Fransisco: Island Heritage, 1974), 65.

Construction

The construction of the hale also had a particular methodology and order to it. Back to front was the basic rule. The thought was that it was bad fortune to have spirits enter the front door of the house before the back wall was closed off. Another way of thinking about it was that you didn't want to paint yourself into a corner, so it is always good to start back to front. Apple diagramed out a basic order of when different parts of the hale were constructed (Fig. 363).

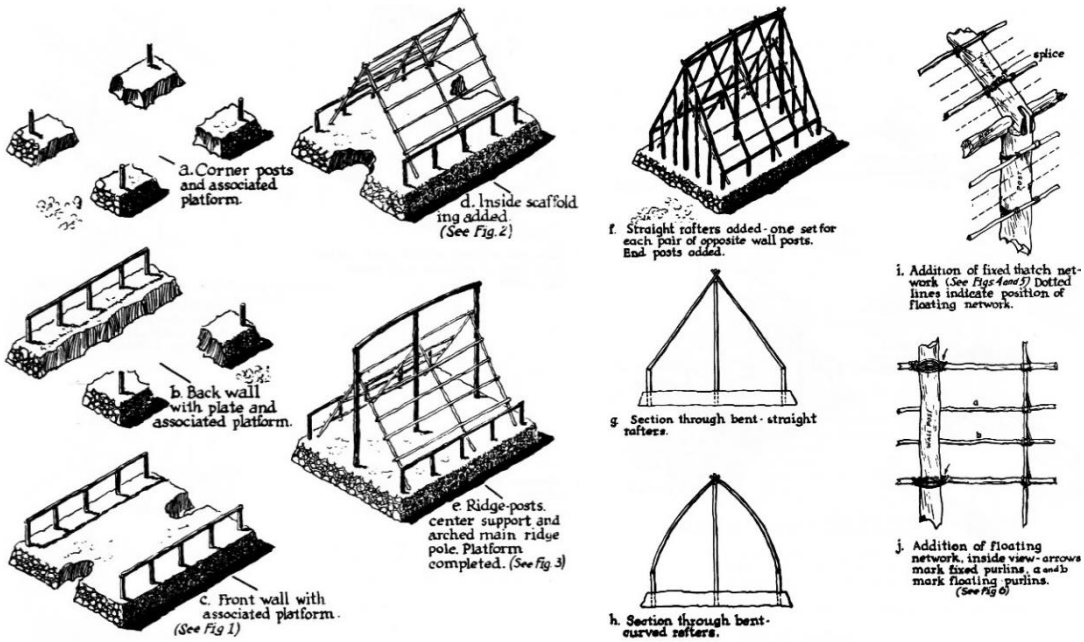


Fig. 363. Apple, *Order of Erection*. Scanned from: Apple, *The Hawaiian Thatched House*, 1974, 89-90.

The corner posts were built into the rock platform base, acting as the foundation. The deeper the base, the stronger the foundation. In the back to front method, and outside-in sequence for post building, the base walls were constructed. Once the base walls were constructed the platform was completed except for an area on either side that was left open in preparation for the ridge posts. An interior temporary scaffolding was built which served as a ladder to build the ridge. The ridge posts and beam were constructed without any lateral bracing to the low walls on the front and back of the house. Roof rafters were the laid on top of the ridge and connected down to the low walls. The rafters were either straight or curved, depending on the construction. In the case of the curved rafters, the members were soaked in salt or brackish water for a period of time right after they were cut down. Then a vice was made of either dirt and sticks dug into the ground, or positioned between coconut trees. The wet pieces of wood were bent into place in the intended curve and left to dry. Several pieces were held into the vice at the same time so that there was a uniformity to the curved structure. The curves not only represented spiritually the dome of the heavens above, but also helped in the strength of the structure, while creating more head room in the interior. On top of the rafters was laid out a 'floating network' of sticks which held in place the thatching.

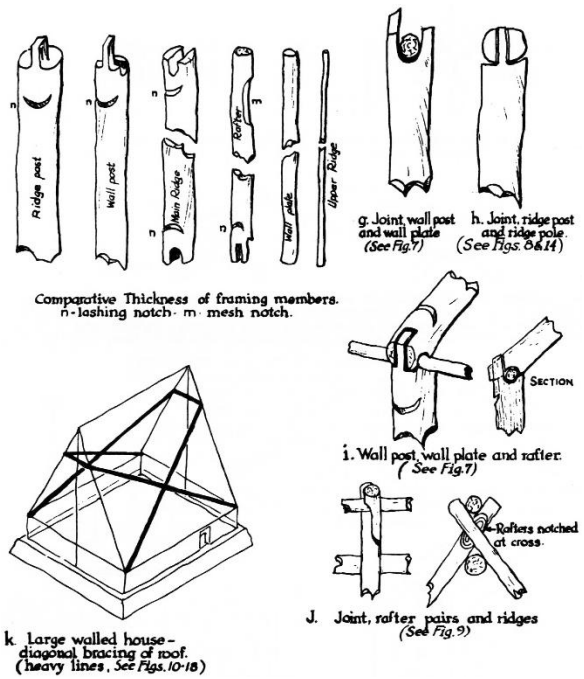


Fig. 364. Apple, *Hale construction details*. Scanned from: Apple, *The Hawaiian Thatched House*, 1974, 91.

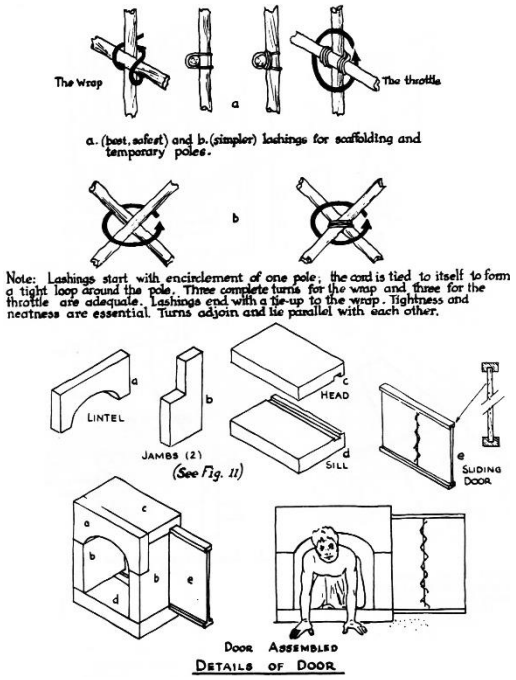


Fig. 365. Apple, *Details of door and thatching*. Scanned from: Apple, *The Hawaiian Thatched House*, 1974, 92.

The joints of the structural members primarily consisted of tongue and groove like configuration that had a pin connection (Fig. 364). This woodwork was done with an adz and chisel. Other joints were lap joints and members with notches for others to pass through. On larger house structures, diagonal cross bracing was necessary to hold the building together. For all of the Hawaiian hale being considered 'primitive huts,' they were well constructed and stable structures that involved intricate joinery. Even the construction and fabrication of the door was quite intricate on the houses for chiefs (Fig. 365). Consisting of several carved pieces of wood that were fit together, the arched opening doorway even had a sliding panel. The sliding panel fit inside of groves in the head and sill of the doorway that allowed it to be opened from the inside of the hale. On commoner's houses, the door opening was just a simple parted kapa cloth flap, but still allowed for privacy.

Types of rocks

The Kuhikuhipu'uone was primarily charged with the layout of heiau which are built on large dry-masonry platforms. In a heiau, the stone platforms were made to elevate the ground plane closer to the heavens, however there were many practical reasons for creating these stone platforms in hale construction as well. Most commoner's shelters were built right on top of the ground with no real foundation. Sometimes on shelters with no low walls the rafter ends would be dug directly into the ground. Sometimes they would rest on a sill beam that was pegged into the ground. But the best method for house construction was to make a platform out of lava rock found on the site. As Apple explains,

> From a structural standpoint, a high platform permitted a high house. Since the amount of embedding of Hawaiian post ends was directly related to wall height, a high platform permitted deep embedment of posts. This was essential in the

> Hawaiian house because there were no tie beams between walls or rafters. Any pressure of the walls or roof had to be directly resisted by the post ends in the foundation. On-site soil or sand, if of sufficient depth, also permitted deep embedment of posts. The principle disadvantage of burying posts ends in soil or sand is that they rotted quickly, especially in rainy areas. Hilo on the Island of Hawai'i, for example, had few rocks in natural occurrence, and the practice was to embed the posts directly into the usually damp soil. The Kona district of Hawai'i Island, on the other hand, abounds with loose rock, and dry-masonry platforms were plentiful.[219]

Rock platforms had a very structural usage that directly related to a social one. A high chief would have a high platform for his house to be built on, and within that lay another platform for him to sleep on. The higher the platform, the greater the importance of the individual living there. Because of the relationship between foundation size and ridge height, the large platforms created larger houses and therefore greater interior space. This lead to a difference in lifestyle. For the commoner's house was small and one usually couldn't do much more than lie down in it, it was primarily only used for sleeping and protection from the elements. Most of their usual daily activates happened outside. The chief on the other hand spent the majority of their time indoors. This was spiritually to protect their *mana*, but it was also because their larger houses allowed this lifestyle. The construction of the platform, or *kahua*, was also something that required much skill and knowledge. Because of the dry-masonry technique, the stones had to be fitted together like a puzzle so that they didn't move. There were different types of stones used in different places of the platform. The mortar-less construction also allows for air to move through the platform, as Apple explains,

> Dry-masonry house platforms permitted rain water to drain away from post ends, and air to enter. Dry rot was kept to a minimum in this situation. Unworked basalt boulders from one-half the size of a human head up to rocks weighing many tons were interlocked in good dry-masonry practice to form the outer walls of the house platforms. Usually the platforms were rectangular in plan, with distinct corners. Outer faces of well-built dry-masonry platforms had batter, an inward slope backward and upward. The space between the walls formed a box open at the top. This was filled with rubble of unworked basalt rocks, of one-half the size of a human head down to chips and bits. Sometimes, if the material was at hand, coral fragments were mixed with the basalt rubble for the fill. The upper surface of the platform was finished with the laying of a lumpy, but level, floor of unworked basalt rocks. The one half human head size designation is an arbitrary division between rocks suitable for wall use and those used for fill.[220]

[219] Apple, *The Hawaiian Thatched House,* 59
[220] Apple, *The Hawaiian Thatched House,* 59-60

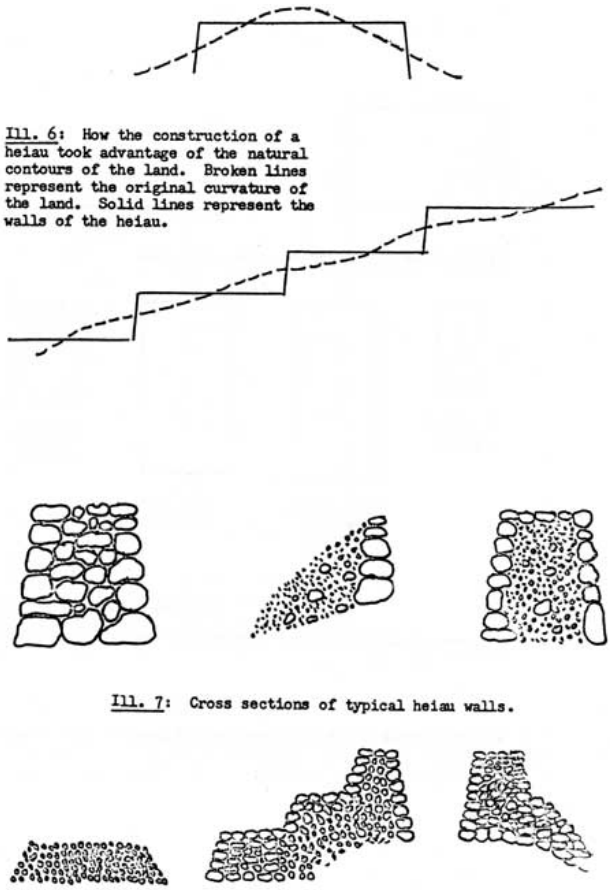


Fig. 366. Haas, *Heiau platform construction*. Scanned from: Haas, *Hawaiians as Engineers*, 1964, iv.

The platform was also integrated well into the landscape, especially in heiau (Fig. 366). Hawaiians used the natural topography of an area to help build up the size of the platform. Sites with a mound would be built around to make construction of the platform easier. In sites with natural slopes to them, platforms would be built as terraces progressing down the hillside. The illustration on the left also shows a typical cross section through heiau walls showing how the larger stones are placed on the outside of the walls. They are not only the more 'finished' looking stones, but also help hold in the smaller rubble stones inside. The stone walls, or *PaPōhaku*, were built around heiau and were also used in inclosing fishponds. Fishponds were another task of the Kuhikuhipu'uone. The *Luakini* type of heiau was particularly known for its use of stone walls and platforms. The size and grandness of these heiau represent not only how important heiau were to culture of Hawaiian people, but also show their ingenuity and collective resourcefulness in constructing such large structures.

Proper ways to lash pieces together

There were no nails or mechanical fasteners in Hawaiian construction. Joinery was carved in the wood with primitive tools and the majority of the binding between pieces was done with lashings. The cordage used in these lashings was extremely strong. Members of Captain Cook's crew even noted on their trip to Hawai'i that the cordage was as strong, if not stronger than their own rope of twice the size. It was a major commodity for early explorers coming to the islands and was often traded. There were different types of cordage however, depending on the material and the way in which it was braided. As Apple explains,

> Vegetable fibers of coconut, bark, vine and grass were prepared and braided into cord which were either round or rectangular in cross section. The flat, braided cordage (hilo 'o'io paki'i in Hawaiian) probably was preferred for decorative lashings on canoes and houses, while the round (milo maoli) served for other uses as well. There may have been some practical advantages to the shapes. Cordage came in different sizes, from threads to ropes. The generic Hawaiian name for cordage was 'aha.[221]

[221] Apple, *The Hawaiian Thatched House,* 75

The illustrations bellow, show examples of the lashings used in a Hawaiian walled thatched house. In Fig. 367, Apple illustrated out the details of how the post to plate connection was thatched. The wood pieces were fit together in a way in which one cradles the other. In order to make sure that the two pieces don't separate from uplift or breakage, they are lashed together. The lashings are fit into groves cut into the wood to makes sure there is no slippage. In the end, a decorative and structural joint is made and the tectonics of its construction is apparent in the finished form. Similar techniques are used for other joints in the hale construction (Fig. 368). Joints were usually pre-fitted and tested for the larger pieces and then propped into place and lashed. But the majority of the joinery is all fabricated in place. This insures that pieces meet at appropriate angles and that pieces fit even with an approximate measuring system and inconsistence of member size.

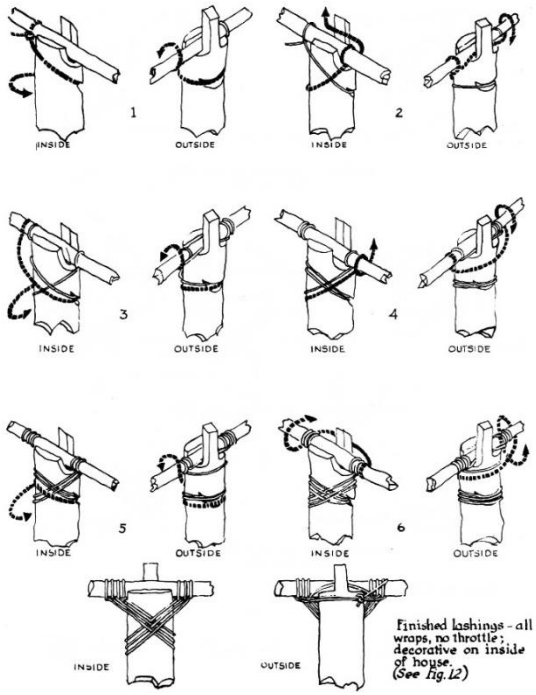


Fig. 367. Apple, *Lashing diagram, post to plate*. Scanned from: Apple, *The Hawaiian Thatched House*, 1974, 111.

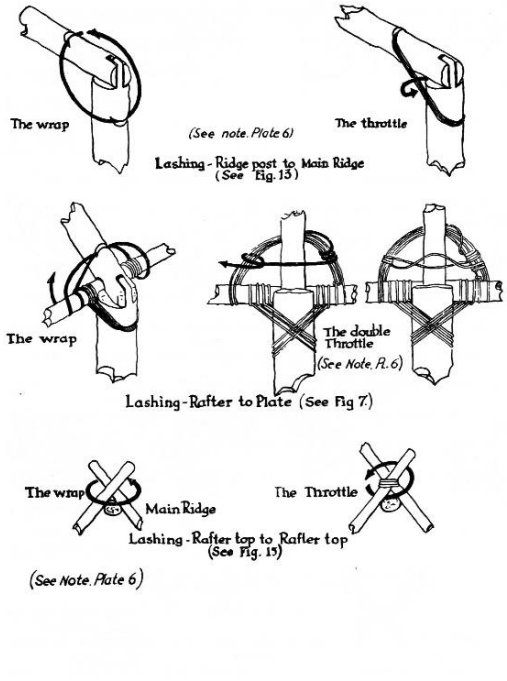


Fig. 368. Apple, *Lashing diagrams*. Scanned from: Apple, *The Hawaiian Thatched House*, 1974, 112.

Thatching techniques

The thatching on the outside of the Hawaiian hale was an important part of the house and required much skill and help from many people to complete the task. The most common type of plant type to be used for roof thatching is pili grass. As Apple explains,

> The name pili is linked today with the specific grass Heteropogon contortus. In historic and prehistoric times pili may have referred to more than one type of grass or long leafed thatched material. But pili, of whatever kind, was the preferred and usual thatch material in historic times. Among its advantages were: it could be harvested in quantity in a short time from a limited area; it took no care in handling or transportation other than to keep root ends faced in the same direction; once cut, it needed no other preparations and application

was swift; it was reputed to take on a pleasing reddish color; it gave a pleasant odor to a newly thatched house; and probably it lasted longer and shed less chaff than other grasses, sedges or bulrushes. Other grass-type materials may have been as handy to harvest, handle and apply, but apparently had disadvantages, perhaps early disintegration, rotting when wetted frequently, and/or high leakability.[222]

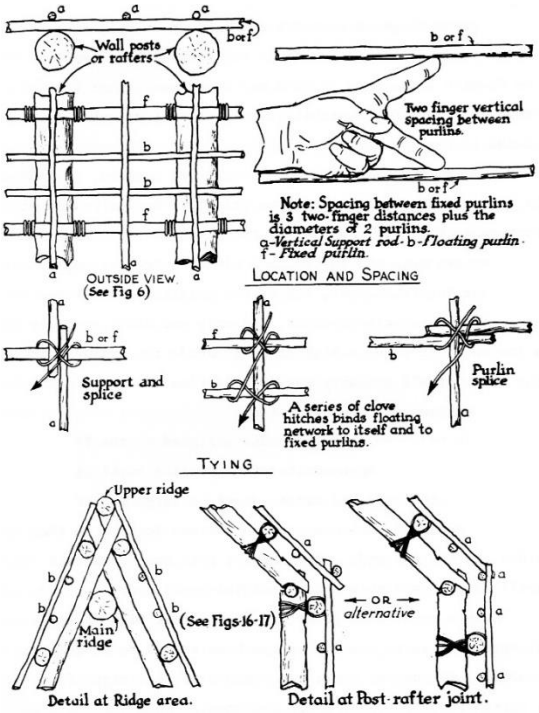


Fig. 369. Apple, *Thatch network*. Scanned from: Apple, *The Hawaiian Thatched House*, 1974, 158.

The thatching of a Hawaiian hale was attached to a network of purlins that were lashed to the main roof rafters at regular intervals (Fig. 369). This network was either a floating network or a fixed network. The fixed network worked well to not only help stiffen the overall house structure, but also worked as an outside ladder so that the thatcher could scale to the top and work their way down. As it was being installed, workers would start from the bottom and lash sticks to the rafters at an interval of the space between two outstretched fingers. They would then step on the members bellow as they worked their way up. The spacing also depended on the type of thatching that was to be used. Depending on the material and the style in which it was applied, a different spacing would be required. The floating network consisted of both horizontal and vertical purlins lashed together, then fastened to the vertical roof rafters.

Ti leaves were also an option for the thatching of a Hawaiian hale. The process to use ti leaves required a specific harvesting and an extended period of soaking time. Dried, dead ti leaves were the only variety that could be used for the thatching. Apparently, green or cut and dried ti leaves wouldn't have the proper strength to them for thatching – they needed to be ti leaves that were dead and had fallen off the plant on their own. Thatching techniques are show in Fig. 370 and Fig. 371. On Ti leaf thatching, the thatching pattern can be seen from the inside, exposing both the tectonic language of the structure, and the weaving of the thatching. The inside and outside characteristics of thatching are quite different in that from the interior it looks like a regular pattern, from the outside it takes on a leafy texture.

Pili grass thatching is even more so. Pili grass is bunched into bundles that are then attached to every other purlin by means of rope (Fig. 371), instead of with a piece of pili. The ti leaf method uses weaving and folding to attach itself to the purlins. Because of the bunching of the pili grass, there is an even greater appearance of a haystack from the outside of a hale. Bunches are cut into regular lengths and are braided together at corners and at the ridge, but let loose to fall over each other on the rest of the house.

[222] Apple, *The Hawaiian Thatched House,* 68-73

There weren't many openings in the Hawaiian hale, other than the small door at the front. Typical hale had only one door and one small opening for air in the roof. The doors were at the low ends below the roof, rather than on the sides as to not let cool wind through and keep out heavy rain. This left the interiors quite dark without many openings, so sometimes is was noted that users would reach up and part the thatching to let a small amount of light in during the day. This primarily only happened in high chief houses as there was a need to light the interior during the daytime. Commoners were not often in their houses during the daytime and their houses weren't designed as such. There was also several other kinds of roofed structures other than the hale. There was also a kind of A-frame structure that was built close to the water for covering canoes for building and maintenance, this was called a hale *halau.* There was another structure which was a simple thatched roof supported by posts at the four corners used to protect people from the tropical sun during the day. This was primarily used for working under and refuge from the heat, and was referred to as the *lanai*. This shelter type is used today and refers to any partially sheltered, outdoor space in Hawai'i.[223]

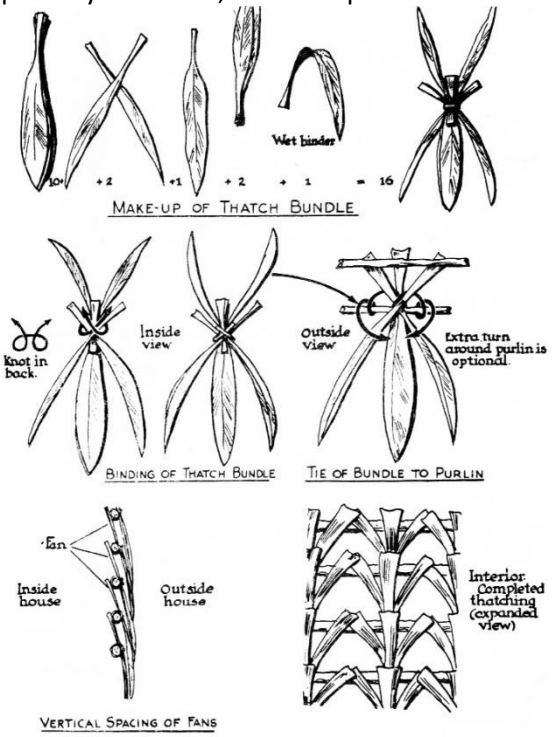


Fig. 370. Apple, *Crossed ti leaf thatching*. Scanned from: Apple, *The Hawaiian Thatched House*, 1974, 159.

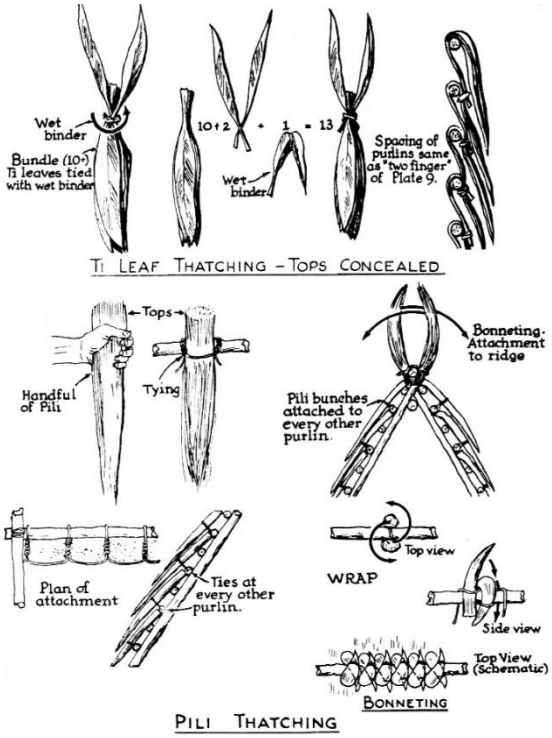


Fig. 371. Apple, *Miscellaneous thatching diagrams*. Scanned from: *The Hawaiian Thatched House*, 1974, 160.

Sizes of the hale and manpower needed for each size

There were many different sizes of hale (Fig. 360) and much planning was done in preparation of building them. The Kuhikuhipu'uone was charged with the laying out of the hale locations, picking and transporting the material to the site, harvesting the thatching material, and figuring out how much man power was needed for the construction of the hale. It was noted that after all proper planning had been done, a hale took no more than three days to construct. This all relied on proper planning and preparation. When a new house was built for a chief, his retainers

[223] Sakamoto, *Hawaiian Modern: The Architecture of Vladimir Ossipoff,* 93

would all come together and under the observation of the Kuhikuhipu'uone would build his house. Commoners usually relied on just the men of their family to build a house and would either have the Kuhikuhipu'uone come in the beginning to help with planning and preparation, or at the end to help with the bonneting of the ridge thatching. Bonneting of the ridge was quite difficult and required much skill to keep the ridge water tight. It was usually done with several layers of plant material laid on top and tied into the pili grass or ti leaf thatching. Construction of the hale for a high chief or construction of the heiau were set as a form of tax on the people. Especially for the construction of the heiau, all members of a region of the island took part, some in actual building and others in preparing resources for ceremonies associated with the erection of the heiau.

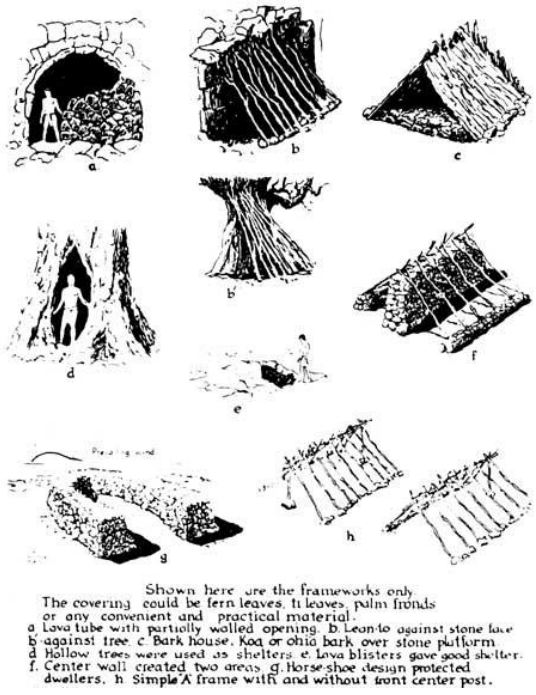


Fig. 372. Apple, *Temporary shelters*. Scanned from: Apple, *The Hawaiian Thatched House,* 1974, 14.

Hale were built close to stable forms of food like fish ponds or agriculture, but many commoners of Hawai'i lived lives that changed locations. A chief, for example might take his family and retainers in canoes around the islands for fishing, trading or leisure. When they landed on different shores they built temporary structures to stay in for the night. Fishermen and other members of the society also had temporary shelters that they made (Fig. 372). These were simple shelters made in caves, trees, lean-tos, A-frames, or consisted of U shaped walls that blocked people from the wind. These shelters didn't require a Kuhikuhipu'uone to plan out, but were still an important shelter to have someone that knew how to build, as they were very practical and efficient with limited resources. They were usually no bigger than what was needed to protect people while sleeping and their design depended on their location on the island.

How to keep out the rain, wind and sun

The basics of shelter was to protect people from the elements. The Kuhikuhipu'uone needed to know how to create a shelter that protected from rain, wind and the sun. The thatched hale's main function was to protect people from the rain, that is why thatching techniques were so elaborate to insure that there was a water tight seal. The ridge of the hale was an important part, as if it failed, the whole thatching would fail. Bonneting of the ridge was something that commoners wouldn't attempt on their own, as the Kuhikuhipu'uone was the only one who knew not only the ritual that went along with bonneting the ridge, but also the proper construction techniques. They usually cut pieces of banana tree bark into sheets that would create the initial waterproofing over the braded thatch. Over which they would braid palm fronds together to create a flashing that would channel water over the initial gaps between bark and thatch to reinforce the barrier.

Living in shelters up in the mountains or close to the ocean left you open to cool breezes at night. The openings on a hale where kept small to maintain the snugness of the interior of the hale. Openings were also usually faced away from prevailing wind directions whenever possible. Enough air movement still flowed through the thatching to dry the interior and keep the air clean on the inside.

There were different types of shelter that were made to protect people during the day from the sun. The simple roof on four post shelter, the lanai, was common in family complexes as it protected people while they worked, usually on making kapa. The halau was used to cover canoe storage and maintenance areas but was also used as meeting areas for a community. This was one of the places in which the *kupuna* would pass on their knowledge to the younger generations.

How to properly drain the site of water

Water drainage was important on mountain sites were it was prone to rain. The hale was built atop a dry-masonry platform that protected it from flooding, but also allowed rain water to percolate through and not build up on the interior. Sites on mountains had special attention to the directions of potential dangers like flash floods and mud slides, so beyond building up platforms for their houses, they didn't build in valleys prone to floods.

How to design against storms

Tropical storms occur often enough in Hawai'i that the hale had to be designed to not crumble in the wind and not leak in the rain. Cross bracing was integrated into the larger hale to provide lateral support and thatching was done so that it would be securely fastened to the structure and could be maintained from the interior in case of emergency. The hale's shape is derived to shed water as easily as possible, while still being structural enough to hold its interior space. Because of the pitch from wall to roof, airflow was pushed up and over the house with less force than hitting an abrupt vertical surface creating greater loads and an updraft. Many nuances of the hale construction made it an integrated structure, where multiple systems though simple in their individual construction, worked together in unison when needed. The purloin network was tied between roof rafters creating extra strength while also making a light structure.

Climate, Design and Construction – i.e. architect

In essence then, the Kuhikuhipu'uone had to understand how to design for the climate and resources of Hawai'i. They knew about construction techniques and structures, rain water protection, the properties of different plants not only in their strengths but also when and where they could be harvested. They planned out the hale and the heiau in not a hap-havoc way, but through careful knowledge and experiences, passed down in ritual and allegory. They were an architect in every sense of the meaning, but they were also much more than that as they represented not only the survival and shelter of the people, but also the perpetuator of their spiritualty and culture. As Apple explains,

> Selection of the site; design and orientation of individual houses and features in clusters and enclosures; selection of timbers and materials, their preparation and transportation from forest to site; and probably overall supervision of

> construction of high chief's houses and temples were the duties of the royal architect (Kuhikuhipu'uone). Much responsibility and trust rested on his shoulders. It was believed that a kingdom could be lost if the architect misbuilt; or won if he was right.[224]

Part spirituality:

For the Kuhikuhipu'uone, practicality did not end with the shelter. If the architect part of the Kuhikuhipu'uone was concerned with structure, construction and sheltering against the climate, the spiritual component extended their concern beyond the immediate site and the current day. Their vision and knowledge for their built architecture connected the shelter to the mountains, the ocean, the seasons, the ancestors, the cosmos and the genealogy of the place. In the time of the Kuhikuhipu'uone, this was as essential and practical as the structure, construction, and shelter. The Kuhikuhipu'uone, after all, was a high priest, called on upon by high chiefs and were the only ones imparted with the knowledge to design and construct the most sacred of places. Knowledge of the cosmos was not only spiritual, it was essential to survival. This knowledge foretold the seasons, when it was time for harvest, war, and peace. It foretold land management and the environment. It also foretold reproduction and the genealogy of not just the Hawaiian people and their history, but all the way to the creation of the land and the birth of the gods.

Kapu and different hale of the kauhale

The Hawaiian hale was a one room structure, therefore, in order to shelter other functions, other hale were built. A single family might have several different hale all grouped together, creating a *kauhale.* The kauhale was a multi-generational homestead that separated different programmatic elements into different structures based on social status and gender (Fig. 373). The kauhale layout was dictated by the *kapu* system.

> In ancient times, the Hawaiian village consisted of many different types of hale. The *kane* (man) built separate hale for himself and his family in accord with the ancient *kapu* system, which stipulated, for example, that men and women were not allowed to eat together. Different hale also provided places for different kinds of work and rest: *hale ali'i* (chief's house), *hale mua* (men's eating house), *hale 'aina* (women's eating house), *hale noa* (where the family mingled and slept), *hale ku'ai* (trading house), and *hālau hale*, which stored the canoe.[225]

The kauhale was about building the relationships of the family, or '*ohana.* The family consisted of the immediate nuclear family, but also included extended family and adopted (*hanai*) family as well. The layout of the kauhale minimized conflict between family members by separating shelters by use. The kauhale was not always a fixed layout from region to region, it also was dictated by secondary functions of work. Agriculture and fishing were factors in the structures of a kauhale.

> The general location of shelters was often determined by the geography of the land. Housing mauka might focus around a lo'i or hale ku'a *(tapa making*

[224] Apple, *The Hawaiian Thatched House,* 30-31
[225] Cheryl Ambrozic, *Home, Thatched Home* (Maui No Ka 'Oi, January-February, 2007).

> *structure)* while those living makai would often be centered around a hale waʻa *(canoe house)*.[226]

The separation of functions was not seen as isolating individuals from the group or seeing certain genders as second class citizens. Instead it was about promoting individuality and bringing people together. Because a family unit worked and lived together, members needed time away from the group, but they were also brought together to promote interdependency and strengthen the ʻohana. The kapu system was in place for many generation, but was eventually abolished by Kamehameha the great, a year before the missionaries came. Changing this system meant a fundamental change in the society and the way people lived – thus the kauhale changed as well.

> The simplicity and orderliness of the hale noa, and with them the sound, normal living of families, were destroyed when the kapu requiring men and women to eat separately was abolished. This meant that food was brought into the living quarters. What had been a clean and neat sanctum for man and wife and their offspring became a free-for-all gathering place for all ages of both sexes. The integrity and meaning of the home no longer existed; with them vanished the orderliness of ʻohana relationship on which the social and economic functions of the community were built. This was a first symptom of the further deterioration in ʻohana relationships, including that between aliʻi and makaʻainana, which was to come about gradually with the later intrusion of foreign and economic and political influences.[227]

[226] Bishop Museum, *Shelter and Kauhale System* (accessed December 14, 2014, http://www.hawaiialive.org/topics.php?sub=Early+Hawaiian+Society&Subtopic=3).

[227] E.S. Craighill Handy, Elizabeth Green Handy and Mary Kawena Pukui, *Native Planters in Old Hawaii: their Life, Lore and Environment* (Honolulu: Bishop Museum Press, 1991), 294-295.

Male and female associations of hale and kauhale

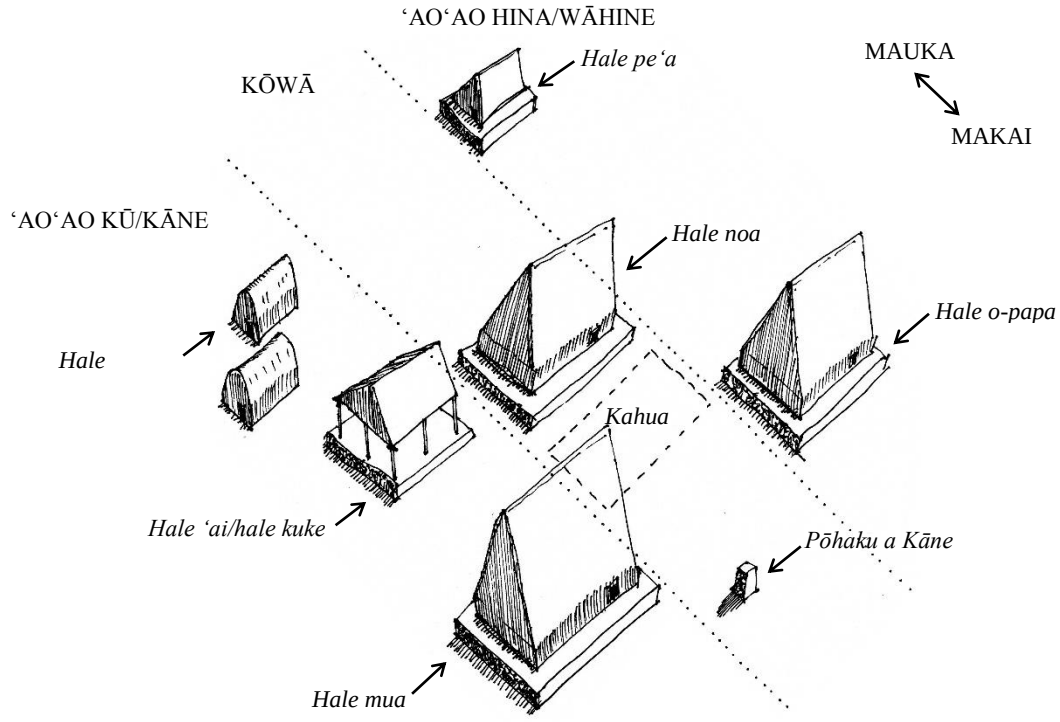


Fig. 373. Illustration by Author, *Kauhale with different structures separated by gender and social status*. Based off a diagram by Bantolina, *Methodology of Papahulihonua*, 2012, 15.

The separation of the different structures of a kauhale didn't happen in a random way but was laid out in zones dictated different places of gender. There was the male side, the female side, and the space in the middle where they met. This laying out of the different hale was done by the Kuhikuhipu'uone and was related to orientation of the site between mauka (the mountains) and makai (the ocean). This denotation of parts of the kauhale that were either Kū or Hina (male or female) also denoted parts of the hale as well.

> Spaces within a kauhale are placed according to the separation of genders. In Hawaiian thinking, a hale [house] and a kauhale is a manifestation of a human body and embodies the principle of duality. Typically, the entrances of a kauhale face towards the ocean, which resembles the front of the body. The right side of a kauhale represents kū. The left side represents hina. Kū is the deity of all things vertical, being steadfast, and the head of a household and politics. Hina is the deity of all things horizontal; representing the life forces of growth, which is an element of Papanuihānaumoku.[228]

In the kū side, there was the hale mua (the men's eating house), hale ʻai (the cooking house), and hale papaʻa (storage houses). On the hina side was the hale o-papa or hale ʻaina (women's eating house), and the hale peʻa (Fig. 373). "In a kauhale, the kōwā is the joining space of gender

[228] Zachary Ikaika Maliʻikapu Bantolina, *Methodology of Papahulihonua: Suggested Guideline of Architectural Site Analysis in Hawaiʻi* (DArch Thesis, Honolulu: University of Hawaiʻi, 2012), 15.

and status where space does not have prohibition."[229] Here in kōwā is the hale noa, where the family comes together to mingle and sleep, and the kahua, where the family played and was an open space for all to enjoy.

Elements of the creation story in hale construction

The *kumulipo*, or Hawaiian creation story, is represented in the structure of the hale. From its posts and the pit in which the main ridge post goes into, to the roof and platform itself, each part of the hale can be prescribed to aspects of the kumulipo chant.

> The interpretation of the origins of hale come from the cosmological prayer called, Kumulipo. This chant describes the origins of life and the branching of many genealogies in the Hawaiian universe. Within this chant, there are prayers for a house structure and space; a prayer for the creation of spatial realms; and the formation of spatial laws. Prayer is the dialogue that connects man and deity. The extraction of those prayers compose its own epoch, thus, a genealogy of hale is created.[230]

Zachary Bantolina broke apart the kumolipo chant into elements of the hale in two different understandings (Fig. 374). One described Kāne as the main post (pou); Laʻilaʻi symbolized as the wall (paia); Maila is represented as the notch below pou (lua); Kiʻi is represented as the "open space" which is the components between the representations of Laʻilaʻi and Kāne. In the other analysis, Laʻilaʻi who is symbolized as the paia, becomes a piʻo enclosing the space; Kiʻi is represented as the pou; and Kāne represents the realm of the heavens (dotted arch). There is another analysis which explains that the horizontal realm is that of Pāpāhānaumoku and everything above that is the hale represents Wākea.

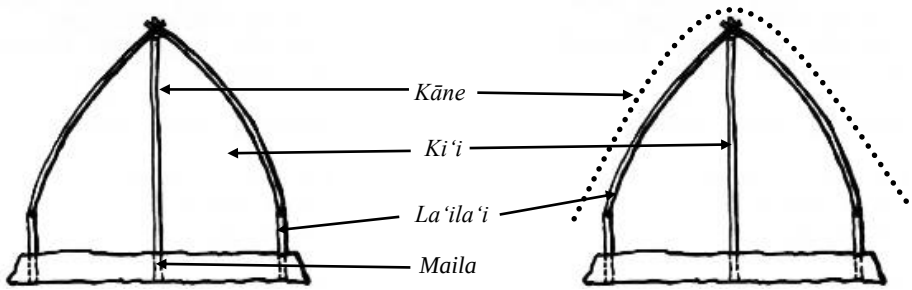


Fig. 374. Illustration by Apple, *The Hawaiian Thatched House*, 1974, 90. Diagram based off Bantolina analysis of kumolipo and the hale, *Mo ʻOkūʻauhau Kō Hale Kuʻi Maoli*, 2011, 9, 12.

[229] Bantolina, *Methodology of Papahulihonua: Suggested Guideline of Architectural Site Analysis in Hawaiʻi, 16*

[230] Zachary Ikaika Maliʻikapu Bantolina, *MO ʻOKŪʻAUHAU KŌ HALE KUʻI MAOLI: Genealogy of a Living Manifestation of Hawaiian Architecture* (DArch Thesis, Honolulu: University of Hawaiʻi School of Architecture, 2011), 2.

Direction of mountain peaks and landmarks

On the Hawaiian Islands, a marker of your location is more commonly found by which direction Mauka and Makai are rather than the cardinal directions. When explaining a place, something is either more Mauka one way, or more Makai the other. On the southern side of O'ahu, or the leeward side, another way to give direction is by mentioning the direction of noted landmarks, like Diamondhead crater, or the Ewa planes. Directions and locations then are given by Mauka, Makai, Diamondhead and Ewa. Even the current city grid is laid out roughly in these directions with roads reaching from the mountains down to the ocean, and roads going parallel to the shore, heading Diamondhead to Ewa. Knowing where a site is in relationship to the general geography of the island is one of the first tasks of the Kuhikuhipu'uone. Once they orientated themselves, they would give recognition to these landmarks in the design of the hale, kauhale, or heiau, depending on where they were and on which island.

> Much like the architects of the mosques, which are oriented toward Mecca, and the builders of the Christian basilicas who placed their apses in the east so that the congregation faced the Garden of Eden, the kahuna kuhikuhi pu'uone aligned the ancient temples known as luakini along an east-west axis to appropriate the spiritual currents leading to the mythological western homeland of Kahiki.
> Similarly, royal palaces were located to overlook the seashore and faced west, in the direction of Kuaihelani, the mysterious island floating in the east that was the home of Pele and her sisters.
> In this way, the Hawaiian architect performed a function higher than merely providing habitation. With his knowledge of the earth's hidden forces and the art of placement and alignment, he harmonized his structures with those of nature and with the world of the spirit.[231]

Because Hawaiian culture and language are place based, there are many different names for different geographic and environmental features of the islands. There are different types of rain in different regions, different winds, and different currents. The topography of the mountains also has more names than there are in English, and are more descriptive to the island's unique topography.

> The natural landmarks of 'āina give the sense of place and are markers for certain occurrences of celestial alignments. The natural forms of mountains are markers, which is called, kualono [region of mountain top]. These markers than become useful in orientation of a space. In Hawaiian thought, these landmarks are the highest spaces on ground scraping heaven's feet and the closes to the deities where transference of mana occurs.[232]

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[231] Island Expat, *Hawaiian Time Machine: View of Hawaii Through the Distroting Lens of Time* (accessed October 14, 2014, http://hawaiiantimemachine.blogspot.com/2012/08/kahuna-of-week-kahuna-kuhikuhipuuone.html).

[232] Bantolina, *Methodology of Papahulihonua: Suggested Guideline of Architectural Site Analysis in Hawai'i,* 6

These natural markers include:[233]

Mauna: highest region of land
Kuahiwi: Ridge outline of mauna
Pane Po'o/Piko: Summit peak of mauna
Lapa: slope
Kualapa: ridge of slope
Pu'u: Hill or sharp mountain peak
Hiwi: sharp ridge
Ana: Hallows with the mountains
Kōwā: open pass through mountain region

Direction of sun – summer and winter solstice, equinox

The understanding of the summer and winter solstice and the equinox were important for the Kuhikuhipu'uone in his laying out of heiau. This understanding would be marked in corners of the heiau kahua or platform. The Ao Polohiwa a Kāne was the summer solstice, the Ka Piko o ka Honua was the Equinox, and the Ao Polohiwa a Kanaloa was the winter solstice. Being able to tell where the sun rises on the Ao Polohiwa a Kāne was a way of telling what time of the year it was, along with the equinox and winter solstice. This was a way of telling the seasons and being able to know when harvest was and when planting time was. The heiau was essentially a calendar of sorts that aligned itself with the sun's path, working as a tool to inform. The way that they would align the heiau to the sun's path was through a process that not only determined the center of the site, but also the corners of the platform. The tool that they would use was called a *kahukū.*

> As the Kuhikuhipu'uone sets himself along the site with the parallel alignments, the kahakū would be upright and three strings will be attached to the staff. Each string were stretch out to mark the corners and mid-point of space in front and back of the Kuhikuhipu'uone. In determining the corners of the space, the Kuhikuhipu'uone would measure the length of each side by the extension of his arms out in front of the body. At each arm extension it points out the direction to a corner of the space. In the investigation of Hāpaiali'i heiau, recently restored and serves as a heiau marking celestial occurrences, the west facing corners of the structure are in the direction of the sunsets of Ao Polohiwa a Kanaloa and Ao Polohiwa a Kāne. This research suggests that Pu'ukoholā heiau was measured with accordance to the path of the sun. The north and south facing walls align with the points of sunrises and sunsets of the solstice. Unlike other heiau of that typology, which it is a heiau luakini [stone institution for politics and war], the spatial organization aligns on the north to south axis, while many others, such as Hāpaiali'i heiau, is organized along the east to west axis.[234]

[233] Bantolina, *Methodology of Papahulihonua: Suggested Guideline of Architectural Site Analysis in Hawai'i, 6*
[234] Bantolina, *Methodology of Papahulihonua: Suggested Guideline of Architectural Site Analysis in Hawai'i*, 13-14

Seasons associated with agriculture and Ku and Lono

The orientation of a heiau to the path of the sun helped to note when certain seasons ended and when others started. Each season not only represented something in the agriculture and natural resources, but also in the society. Seasons coincided with times of war, peace, and politics. The Kuhikuhipu'uone would recommend building at certain times and not building at others.

> To recommend that a house should be built in late April or early May and that is should stand on an upland site between streams is to recognize that the dedication ceremonies would attract gifts or products of both land and sea, which would be plentiful at that time in the Hawaiian Islands.[235]

Because of the relationship and knowledge of their islands, the Hawaiians knew that certain times of the year brought certain prosperities and troubles. Time was not a continuous line moving forward, but accord in cycles. Despite having even temperatures and mild climates throughout the entire year, life on islands still happened in seasons.

The rituals of hale construction associated with luck and fortune

In the construction, planning and ceremonial "birth" of the Hawaiian hale, there were many different rituals that were associated with good fortune and health for the inhabitants. If they were properly followed, not only would the house be built properly, but the people living in them would live to an old age. As Kamakau explains,

> There were many kinds of houses and many ways of building them, with rules, *loina*, to be observed in the (choosing of the) site, *kahua*, and in the building of a house. If the site were an auspicious one (*ina maikaʻi ke kahua*) and the building of the house perfect in every detail according to the rules, the householder would live to be white-haired, bent with age, dim sighted; to crouch before the fire with wrinkled eyelids hanging down upon his cheeks or held up with sticks; to lie down feebly and be carried about in a net; and to go away from the world of light as gently as the wafting of a zephyr. Everything had to be done according to the prescribed rules, (the selection and erection of) the posts, *pou*; rafters, *oʻa*; purlin support rods (between posts and rafters), *hui*; the second, or upper ridgepole, *kuaʻiole*; the purlin support rods (on the backs of post and rafters), *kuahui*; the measuring (*kuene*) for the posts, the fastening (*kauhilo*) of the framework, the lashing (*pueo*) of the timber, the adding (*kuahui*) of supporting rods, the tying on (*hoʻaho*) of the purlins, the lining (*paʻi*) of the inside of the house, the thatching (*kaupaku*) of the ridge, the trimming (*koli*) of the thatch, the cutting of the thatch over the doorway (*ke ʻoki ʻana o ka piko o ka hale*), the spreading of the piles of mats on the sleeping place, and the moving in. Blessings would result and reward for regarding the rules and laws for the building of a house.[236]

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[235] Apple, *The Hawaiian Thatched House,* 25

[236] Samuel Manaiakalani Kamakau, *The works of the People of Old: Na Hana a ka Po'e Kahiko* (Honolulu: Bishop Museum Press, 1976), 96.

Vicinity to amenities like fresh water, fish ponds, agriculture, ocean, heiau

The Kuhikuhipu'uone had to have a knowledge of the islands and its geography and physical features, as well as spiritual features. When building a hale or a heiau it was seen as a good omen to build close to natural resources. As Apple explains,

> Some omens which relate to placement of houses contain practical wisdom, such as the need to level a hilly site and to align the length of the house parallel to the contour. Some omens also state the obvious, such as the advantages of a site near a fresh water pond and/or an irrigated taro field. Other omens recognize that easily reached houses in favorable locations attract visitors who wish to share in the advantages, but who also bring gifts of material things not readily available in the vicinity. For instance, a family of a visiting fisherman would be sure to show up with dried fish at an inland house. To term a hillside house whose door faces uphill "unlucky" is to recognize that it is in danger from descending rocks, rain and mud.[237]

The genealogy of the site

The genealogy of the site was an important piece of knowledge that was vested to the Kuhikuhipu'uone. When building a new heiau, the Kuhikuhipu'uone was the only kahuna who knew where the sacred lands were, where previous heiau were built and how to properly reorder them to serve the purpose of worshiping a different god of for a different cause. This knowledge of heiau not only told of location, but what it was used for, or what type of heiau it was, and also who built it. This genealogy of the site also informed the Kuhikuhipu'uone of where sources of fresh water could be found in the vicinity of the site. But there is more to it than just the knowledge of what was previously done on the site and where fresh sources of water are located, there was also the genealogy of the Hawaiian people that was tied to the land. The Hawaiian people are Kanaka Maoli, people of the land, and their relationship with the land comes from a genealogical spiritual basis as the Kanaka Maoli and the islands were born from the same ocean. Building on the land is building with a relative.

Namesakes of the site

The names of the different parts of the islands are descriptions of their place. Each name means something in Hawaiian that either describes the climate, the geography, something about the environment, or is related to an important historical figure associated with that place. The name of a place is related to the site's genealogy and the site's environment.

> The names of celebrated places are in accordance with land features and or a celebrated hero, which is an element of Papanuihānaumoku. Many place names we know today are associated with freshwater such as Waiʻaleʻale (Kauaʻi), Waiʻanae (Oʻahu), Waiheʻe (Māui), and Waiākea (Hawaiʻi Island). There are also place names associated with description of the landscape such ʻĀliapaʻakai (Oʻahu), Haleakalā (Māui), Ka Lae (Hawaiʻi Island), and ʻEleʻele (Kauaʻi). Place names associated with celebrated heroes or aliʻi are Hilo (Hawaiʻi Island), Kawaiahaʻo (Oʻahu), and Kāneʻohe (Oʻahu). With every place in Hawaiʻi there is

[237] Apple, *The Hawaiian Thatched House,* 24-25

a story and it's within the story there are descriptions of land features and poetical references associated with the flora and fauna.[238]

Ahupua'a

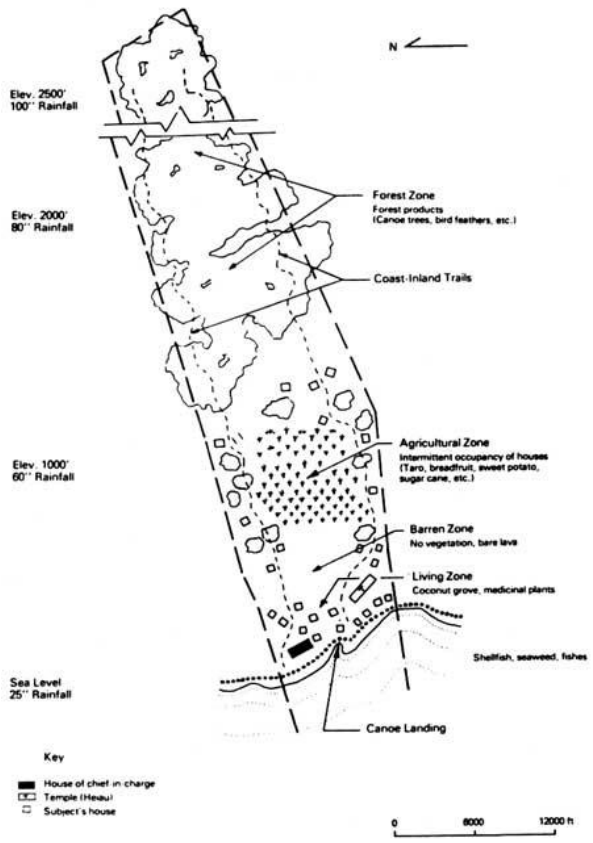

Fig. 375. Kirch, *Diagram of the Ahupua'a system*.

The ahupua'a system was the Hawaiian form of land division and land stewardship (Fig. 375). Areas of the island were divided into pie shaped regions that reach from Mauka to Makai and encompassed many different climatic zones representing different resources that could be obtained there. It was a form of land stewardship in that everything that was taken from the ahupua'a had to be replaced or returned back to the earth. The streams that came down from the mountaintops were directed into agriculture fields called lo'i, were they grew taro. The water from the streams always was returned back into the stream so that it did not affect the ecosystem. Hawaiian's understood that if they upset something at the top of the mountain, its effects will be felt at shore. The nutrients that were collected in the stream fed the fishponds at the mouth of the valleys where the fresh water and salt water mixed. All of the essentials to living in Hawai'i could be found in one ahupua'a, and the careful management of it maintained their survival.

Prior to European contact, each of the major islands or independent chiefdoms in the Hawaiian chain comprised a *mokupuni.* Each island was divided into major districts, or *moku,* administered by high-ranking chiefs. They were either relatives of the high chief of the island, trusted supporters, or high ranking individuals who pledged their support to the high chief but were allowed to remain relatively independent. In ancient Hawai'i, land division and the resulting economic system reflected both geographic conditions of the environment and characteristics of the social organization of the people. The land pattern established in Hawai'i was based on the wedge-shaped land divisions typical of mountainous islands in Polynesia. These divisions *(ahupua'a)* radiated from the interior uplands, down through deep valleys, and past the shoreline into the sea. They became the basic unit of the Hawaiian socio-economic organization (Fig. 375). This type of land division allowed exploitation of all the resource

[238] Bantolina, *Methodology of Papahulihonua: Suggested Guideline of Architectural Site Analysis in Hawai'i,* 7

> zones of the island — forests, agricultural land, shoreline, and ocean — by a single socio-political group and guaranteed them some degree of self-sufficiency and economic independence. These zones provided fish; taro fields; logs for firewood, ridgepoles, and canoes; bark for *kapa* cloth; and bird feathers for cloaks and helmets. They represented a continuous range of environmental conditions in terms of rainfall, soils, and species of vegetation, provided diverse natural products, and supported a variety of crops and domestic animals. The boundaries of these land divisions, each of which had a specific name, were determined by topographical features, such as ridges and streambeds, rather than by artificial delineations. Initially, as in other Polynesian systems, kinship-based corporate descent groups occupied these divisions. In Hawai'i, however, this system of land tenure eventually developed into a local variant that was much more politically based. The determination of socio-political boundaries by the exercise of power rather than through kinship ties is a formulative characteristic of emergent states.[239]

It was important for the Kuhikuhipu'uone to understand what ahupua'a a site was in which region of that ahupua'a. There was three major regions to an ahupua'a, there was mauka (the mountains), kula (the valley floor), and makai (the ocean). Each different zone produced different resources, so the Kuhikuhipu'uone needed this knowledge to understand how this site would fit into this land management system. If it was closer to the ocean there would be a focus on fishing and voyaging, so there would need to be a hale halau. In the mountain regions, close to stream would be lo'i and plentiful rain, so the kauhale would need a hale for making kapa and pounding poi. There were distinct pathways that stretched mauka to makai for people living in an ahupua'a to trade within their region. Building a kauhale close to these paths would ensure many visitors, which was important as they brought gifts and news.

This system of land division can still be seen today in a socio-political way, not as a way to manage resources. Neighborhoods and cities are named after the ahupua'a and the land development more or less mimics the border lines of an ahupua'a. This is most likely because the ahupua'a were carefully constructed regions that were informed by the topography and the resources. We still see their shadows today because development still follows topography in most cases, rather than superimposing a plan onto the site. There is much talk still today in the planning and architecture communities about creating the contemporary ahupua'a and following it as a model for sustainability.

Many of the spiritual practices of the Kuhikuhipu'uone were based on place based observations and knowledge. Architecture, like language and dance in Hawaiian culture, was a fixed structure in which to impart knowledge and perpetuate their identity. The religious aspects of Hawaiian spiritualism was a way of understanding the phenomena of the cosmos and character of Hawai'i. It is important then to not only recognize the architectural side of Kuhikuhipu'uone, but also the spiritual, as it informs us not only of how to shelter climatically, but how to live harmoniously with the islands environment.

[239] Diane Lee Rhodes and Linda Wedel Greene, *A Cultural History of Three Traditional Hawaiian Sites on the West Coast of Hawai'i Island* (Denver: U.S. Department of the Interior, 1993).

Critical regionalism or Place Specific Modernism for Hawai‘i

When it comes to the built manifestations of critical regionalism, there are two forms, or influences for a regional understanding in their architecture. One is form – the architecture of the region – the other is concept – the spirituality and culture of the region. These help to influence characteristics of an architecture that make it respond to the place. The factors for a regional character come from those laid out by Henry Seckel – context, material, climate, setting, cultural background and environmental living. But the built manifestation of these factors come through as either form or concept. A building either looks like it is of the region, or it represents notions of the region conceptually. Some do both. This ties back into the two parts of the Kuhikuhipu’uone – architecture and spirituality – the formal solutions, and the spiritual understandings.

Form: architecture

The formal influence of Hawaiian architecture on critical regionalism could be seen in many different physical manifestations. From the obvious where the architecture is designed to reference the shape of a hale with its steep roof and high ridge. Or it could be the structure of the hale – a very tectonic and honest structure where rafters, posts and beams are all exposed on the interior and connections are celebrated between members of the system. Contemporary architecture has given visual references or aesthetic nods to Hawaiian architecture in an overtly romantic way. High-rises are seen topped with steep pitched roofs mimicking that Hawaiian hale in form, but not in purpose. For an honesty in formal reference in critical regionalism, it is not the aesthetics of the architecture that should be looked to achieve, instead it is the regional design solutions that are authentic to the place. The shape of the hale was built that way for a reason, to shed rain water off of the thatching. If a roof in contemporary architecture could be built so that it literally doesn’t rot under constant soaking, then what reason is there for it to have this same design feature? The incorporation of regional characteristics in modern architecture is to authentically and honestly perpetuate well tested and ingenious ideas that are indicative of the place. Not only are formal design solutions relevant, but so are material and climatic solutions as well. Often local building materials are added to regional buildings as that material responds to its place. It is of both the pallet, and same rigor from which the architecture should be designed. Climatic solutions are too often overlooked. Before the advent of air-conditioning, buildings were built to take in natural breezes, insulate from the sun, and collect sources of fresh rain water. With technology came commodity and a forgotten knowledge of how to design climatically responsible. All of these are different ways that the form, or the architecture, can respond to architecture of the past, and of the place.

Concept: spirituality

The other manifestation of regional characteristics is through its concept. This is related to the spirituality of the Kuhikuhipu’uone and their understanding of the natural world of Hawai‘i. The genealogy of place is a concept that can give meaning to design decisions. It can be used as the foundation for a design that stems off from the history of the site and moves forward with the past, not away from. As was discussed, the genealogy of place influenced the Kuhikuhipu’uone in where to locate important structures, but also in honoring those that came before. The customs, or ways, of a people can be a concept for regional design. There are certain rituals, either spiritual, religious, or every day, that people of a region practice. They don’t have to have specific meaning, but they are common place to all people of that region. An understanding of

place is an important driver in regional design. Understanding the place extends beyond just understanding the site, its topography and climate. It is understanding its context, both built and natural. Connecting a design to not only the physical, but also the interval of time helps to create a timeless regional design. A place is constant, but time is forever changing, being able to recognize the cycles of time in a place create an experience that is unique to its location. The culture of a region is important in driving the design. Who a design is for is as important as what the design is doing. Cultural manifestations in architecture can be seen in the priorities and rhythm of the architecture. In Hawai'i, nature is an important aspect of the culture. The lifestyle is also something to consider. This is different than the culture in that a lifestyle is the way you do something, culture is thought behind what you do. Lifestyle in the tropics is what Henry Seckel calls 'environmental living.' It is living in harmony with nature to the point where man and nature are inseparable but individual at the same time. Religion, in the western sense, could be another driver. In Hawai'i there are gods and deities and celestial beings that are grounded in the natural environment. These beings have stories and relationships – histories. These histories produced anecdotes but also parts of the natural world. The relationship with Hawaiians and their gods can be seen in their care for the land and ocean they thrive off of.

Some regionalist architecture takes only one influence, some takes both. The point isn't to replicate, it is to learn from and integrate. Times are different, but the idea isn't to bring you back to heyday of the region, but to perpetuate the character and uniqueness of the place.

Critical Regionalism and Indigenous Architecture

It is common for critical regionalism to look at the indigenous architecture and culture of a place. This is for several reasons. One, is that modernism is partially about minimalism. What do you need to minimally create space, create architecture, and create structure? When modernism was first being born, the idea was to create a new kind of architecture in opposition of what was common at the time, neo-classical, renaissance revival and other types of architecture that were about ornamentation and decadency. Modernism sought to not only get rid of ornament and non-essential components of a building, but also sought to give honesty in their architecture. An honesty in structure, material, and an efficiency seen by the capabilities of new technology. It was then a practice in efficiency and honesty – minimalism. So after the modernism that was an 'anti-movement' ran its course, they needed to rethink their approach, and what it really meant to design minimally. Therefore they started to look to indigenous cultures to learn how they minimally responded to regional factors with limited resources. Namely, climate. Before air-conditioning, buildings still needed to be designed climatically, and primitive and indigenous architecture of a place was a perfect starting point to look for design solutions.

In architecture theory, there is the idea of the 'primitive hut,' put forth by Marc-Antoine Laugier's Essay on Architecture. In it he discusses the misuse of the aesthetics of structure that don't actually represent the true structure of a building. But his introduction of the primitive hut to architecture theory is about a minimal shelter. It is not only a minimal shelter climatically, but it also associated with the place. It was built from local materials, it showed off local craft and techniques, representing aspects of the culture. There is one theoretical idea of the "primitive hut" but many actual representations depending on the place. Almost all areas around the world, if you look into their history, have an actual primitive hut archetype in their genealogy. The reason why I'm looking at Hawaiian culture, and a Hawaiian architecture is to research this

idea of a minimal structure that responds to its place. It is the essence of functionality and regional character.

It is important to note as well, that I'm not looking at architecture of Hawai'i and Culture of Hawai'i, but I'm looking at Hawaiian architecture and Hawaiian culture. There's a difference. I am not looking at plantation architecture of Hawai'i, the Dickey roof, or other vernacular but non-indigenous architecture. I am looking at Hawaiian architecture because of this idea of minimalism. Minimalism is not as a lack of complexity, in fact sometimes something has to be very complex to be 'minimal.' Instead I'm looking at minimalism as essential, thought through, and authentic.

Genealogy

There is one last point in this discussion of Hawaiian architecture as a stepping off point for critical regionalism in Hawai'i. Which is that I am not looking to recreate 'Hawaiian Architecture.' Not only because I am not Hawaiian, but because my genealogy is not of Hawai'i. My culture, though influenced and representing aspects of Hawai'i, is not solely Hawaiian. Critical regionalism looks not at just the genealogy of the place or culture of the place, but also the genealogy of the client, and the genealogy of the architect. It is about the genealogy of the project.

Genealogy of the project

My thesis research looks at Tropical Modernism, the work, and the architects to see what their cultural backgrounds are and how that has manifested itself in the architecture. It is important to understand not only the cultural background or genealogy of the place, to understand the projects being built there. Some of the work being built in a region, or by an individual, is only partially of that place.

There is a comparative analysis I would like to present in the work of Vladimir Ossipoff in Hawai'i, and Oscar Niemeyer in Brazil. Vladimir Ossipoff was born in Russia, raised in Japan, and educated in California. He moved to Hawai'i soon after he graduated college and all of his work is exclusively in Hawai'i. His work represents the "Hawai'i Modern Movement." In his Liljestrand Residence, on the top of Tantalus above Honolulu, he created one of his most well-known pieces of work and culturally diverse pieces of architecture. Dr. Liljestrand was an American that was raised in China. His and his wife's intention was to move back to China but settled in Hawai'i instead. The house represents both Ossipoff's Japanese sense of proportion and relationship with nature. It represented Liljestrand's Chinese experiences in its site location and in aspects of the architecture. But it also represented Hawai'i in its lifestyle and climatic responses. It is a beautiful piece of Hawai'i architecture, but it is of many cultures and therefore the project has a complex genealogy. It cannot be called Hawaiian architecture because of this, but it can be called a beautiful example of Tropical Modernism. Oscar Niemeyer of Brazil, however, is a different example. Niemeyer was born and raised in Brazil, he went to school in Brazil, his clients were Brazilian, and the majority of his work is in Brazil. Here, Niemeyer's projects represent a very singular genealogy. Niemeyer's work represents the culture of Brazil in the same way as art, song, or dance. Niemeyer's name is a common name to most Brazilians, something that cannot be said of many architects. His architecture can be said is Brazilian, meaning both of the place and of the people. It is a beautiful example of Brazilian architecture, and Tropical Modernism. Few often though, in today's world, is a project or a person of one cultural genealogy, but in

critical regionalism there must be a consideration of all three genealogies – client, architect, and place. That is why I undertook this research on Hawaiian architectural genealogy, because in order to create an architecture that not only converses with its place but makes poetry with its surroundings, there needs an understanding of this information.

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